



Montana Department of
ENVIRONMENTAL QUALITY

PERMITTING AND COMPLIANCE DIVISION

Date: JUNE 26, 2007

Number of pages (including this cover page): 17

TO: SITANE MATOLYAK

Fax Number: 406/582-8790 Telephone Number: _____

FROM: MARY HENDRICKSON

Telephone Number: 444-1808 FAX Number: 406/444-1374

Comments: WELL LOGS FOR MISTER M

If you do not receive all of the pages of this fax transmission, please call the sender at the telephone number listed above.

Thank you.

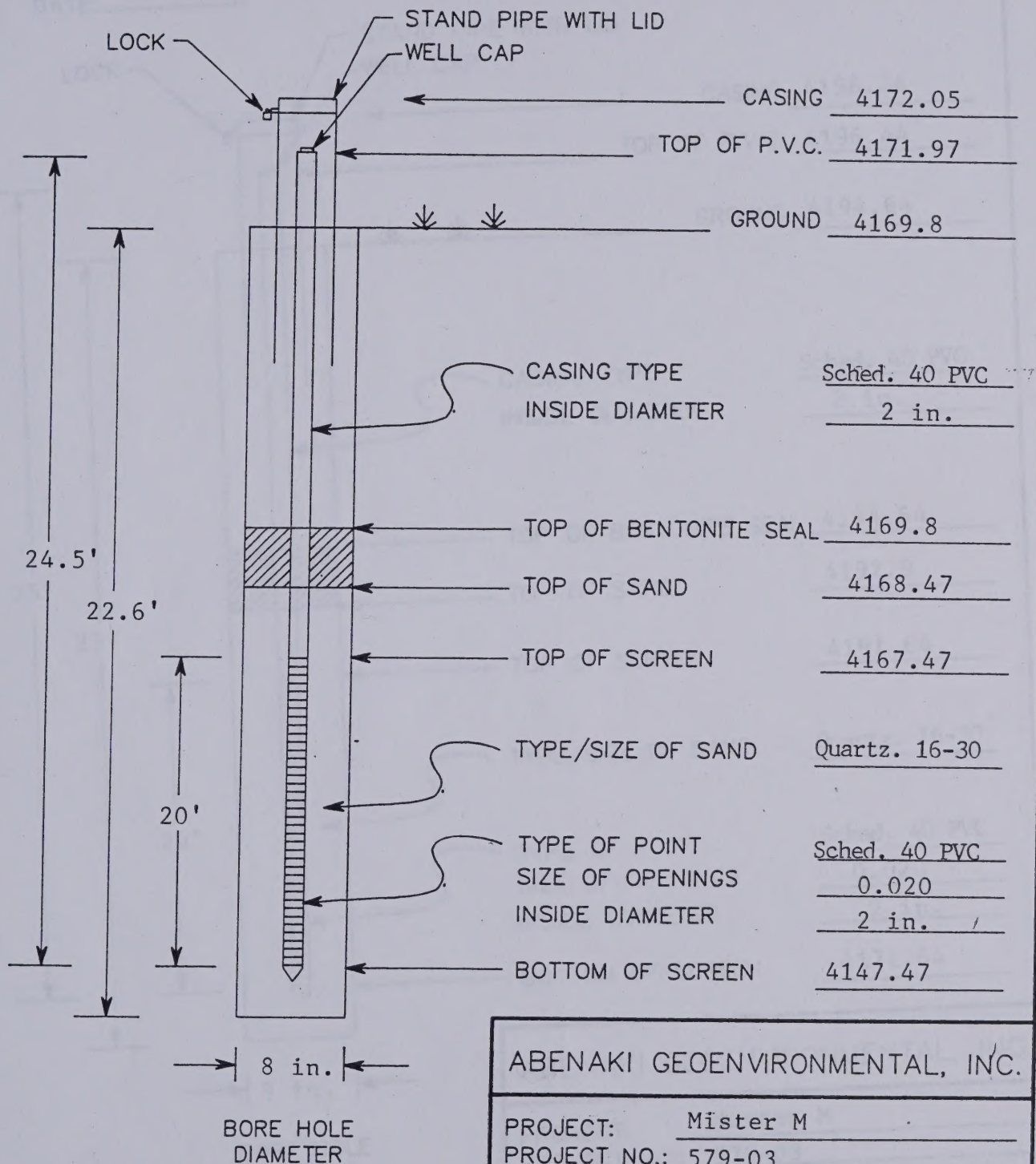
GROUND WATER OBSERVATION WELL COMPLETION PROFILE

WELL NO.: MW-1

OBSERVED WATER SURFACE ELEVATION: N/A

DATE: 6/93

DISTANCE BELOW GROUND: NFGWE



ABENAKI GEOENVIRONMENTAL, INC.

PROJECT: Mister M

PROJECT NO.: 579-03

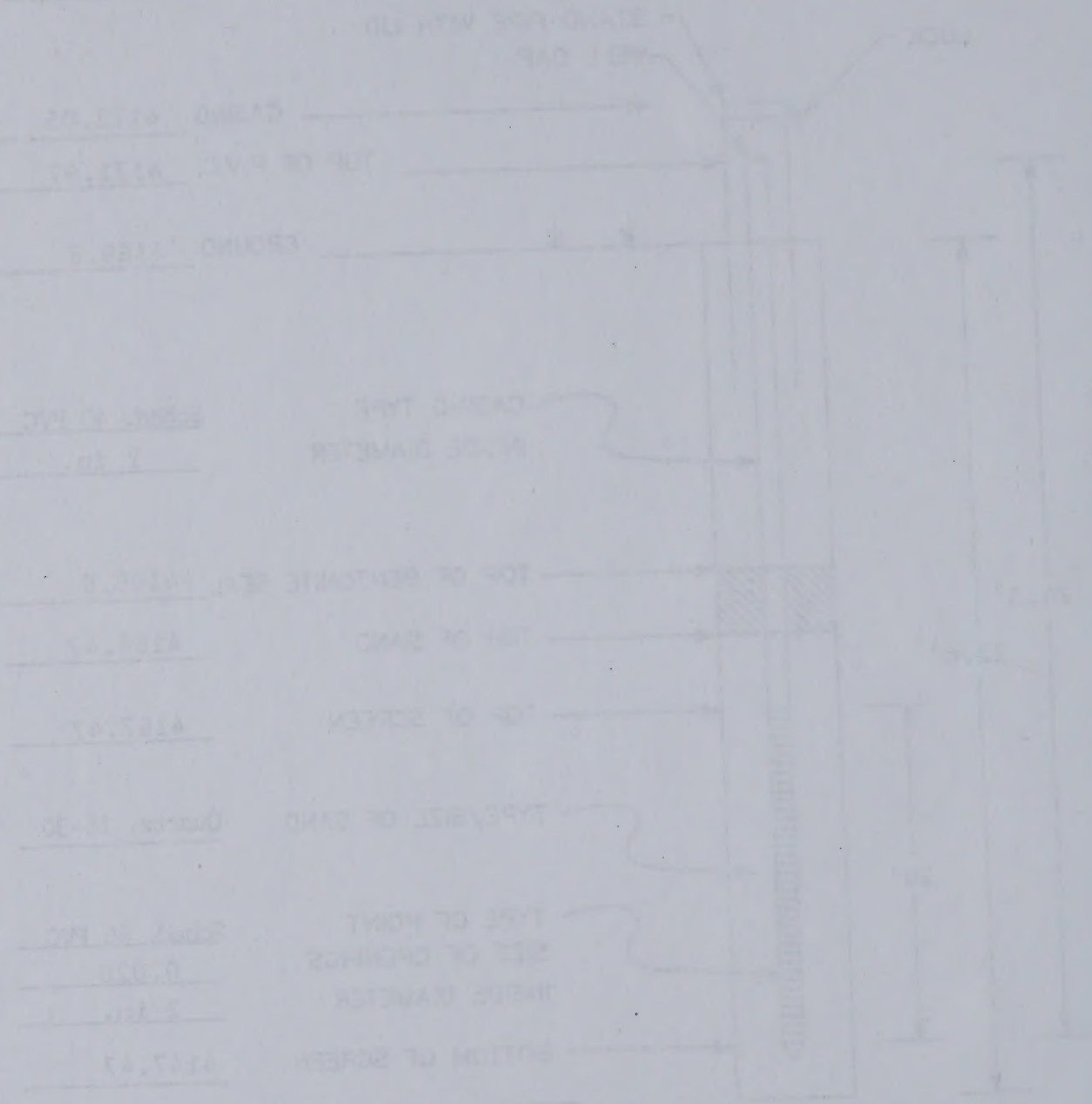
LOCATION: Lewistown, MT

DRILLING DATE: 6-16-93

COMPLETION DATE: 6-16-93

GROUND WATER OBSERVATION WELL COMPLETION REPORT

WELL NO. 12-1
DATE 1/23
DESIGNED WATER SURF OF ELEVATION 814
DISTANCE BELOW SURFACE 1000



ABERNATHY GEOPHYSICAL INC.	
PROJECT	WELL NO. 12-1
LOCATION	10-11
DATE	1-23
COMPLETED BY	1-23

WELL NO. 12-1
DATE 1/23

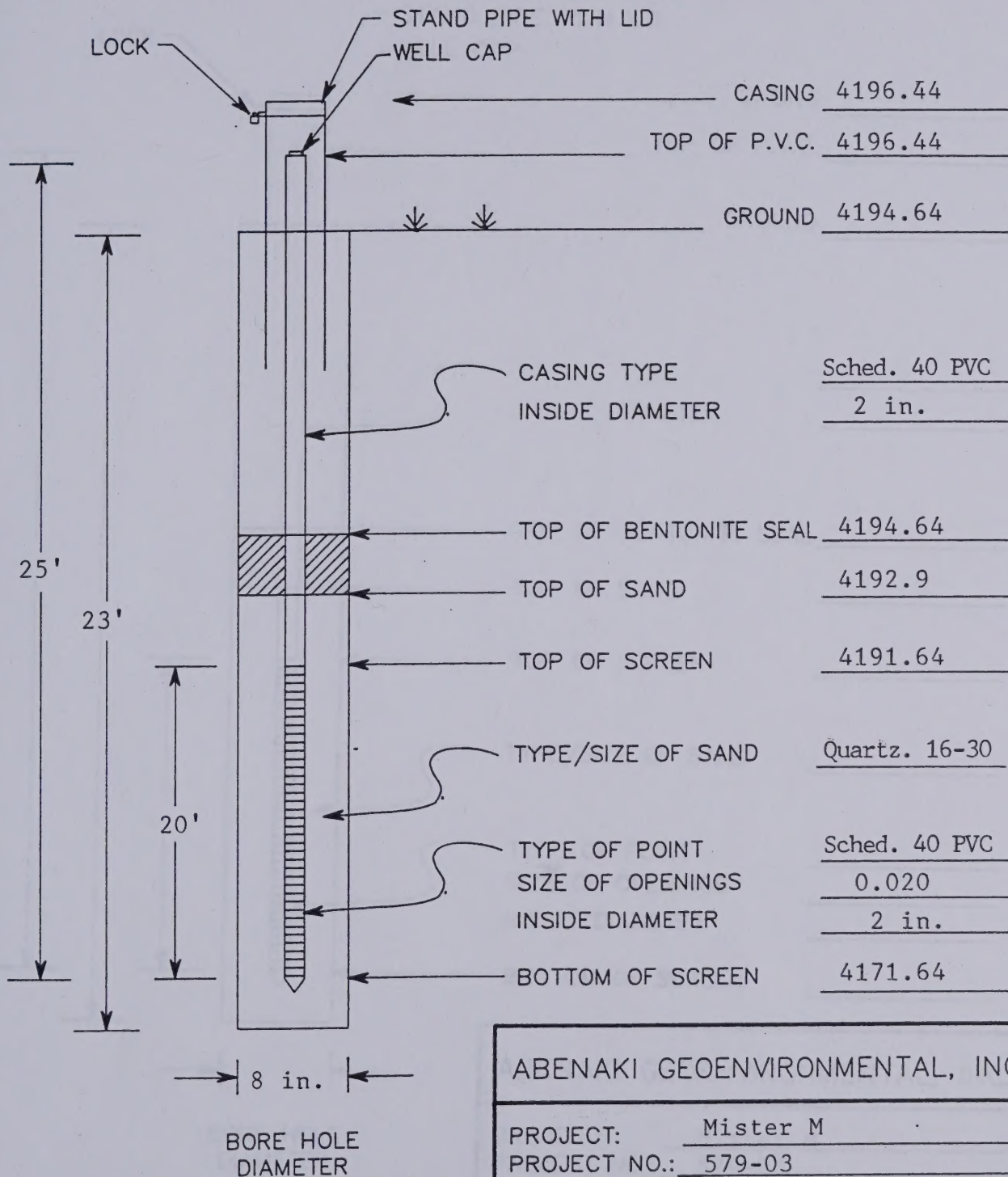
GROUND WATER OBSERVATION WELL COMPLETION PROFILE

WELL NO.: MW-2

OBSERVED WATER SURFACE ELEVATION: N/A

DATE: 6/93

DISTANCE BELOW GROUND: NFGWE



ABENAKI GEOENVIRONMENTAL, INC.

PROJECT: Mister M

PROJECT NO.: 579-03

LOCATION: Lewistown, MT

DRILLING DATE: 6-16-93

COMPLETION DATE: 6-16-93

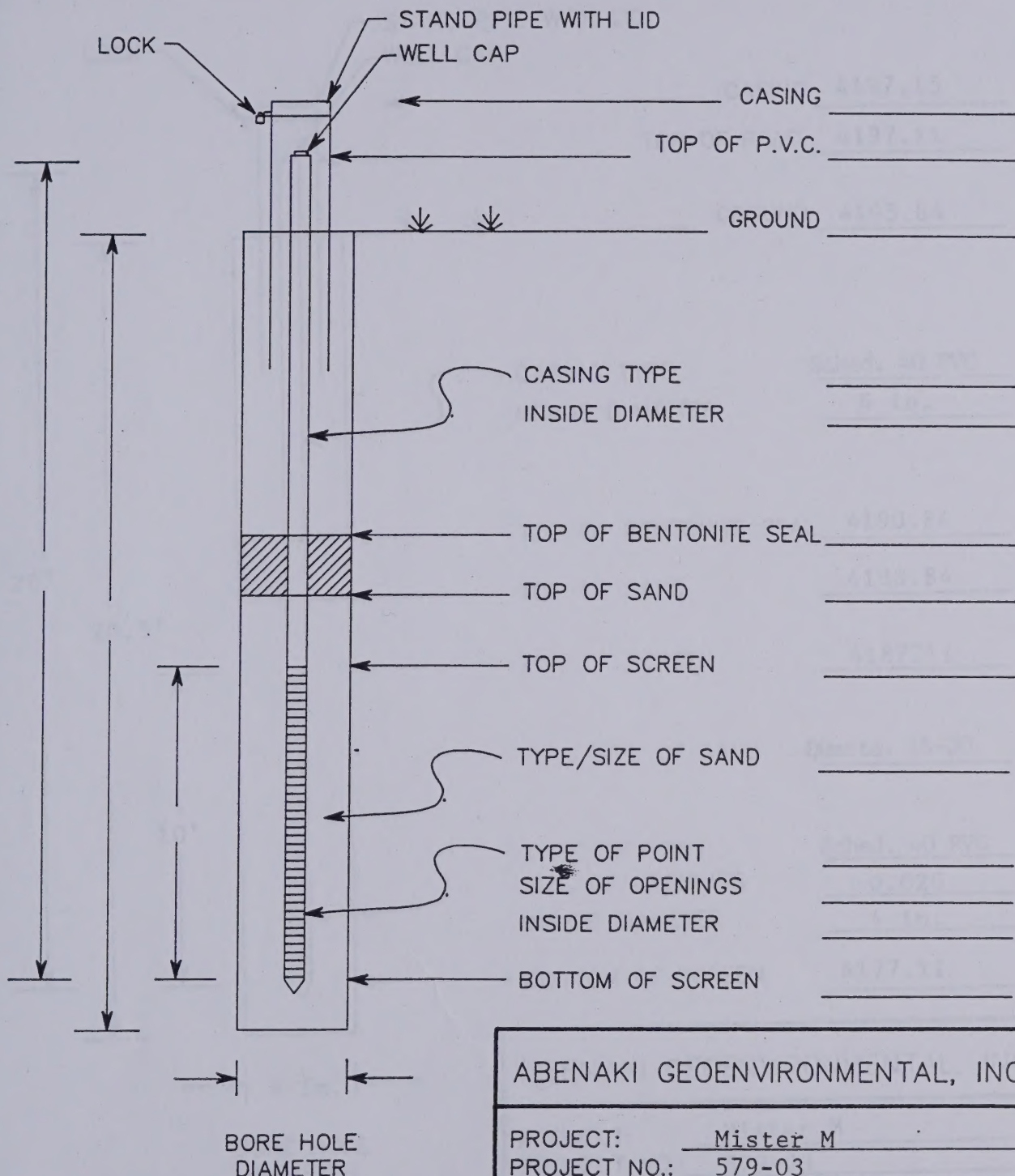
GROUND WATER OBSERVATION WELL COMPLETION PROFILE

WELL NO.: MW-3

OBSERVED WATER SURFACE ELEVATION: _____

DATE: 6/93

DISTANCE BELOW GROUND: _____



ABENAKI GEOENVIRONMENTAL, INC.

PROJECT: Mister M

PROJECT NO.: 579-03

LOCATION: Lewistown, MT

DRILLING DATE: 6-16-93

COMPLETION DATE: 6-16-93

NOT INSTALLED
SEE BORING LOG

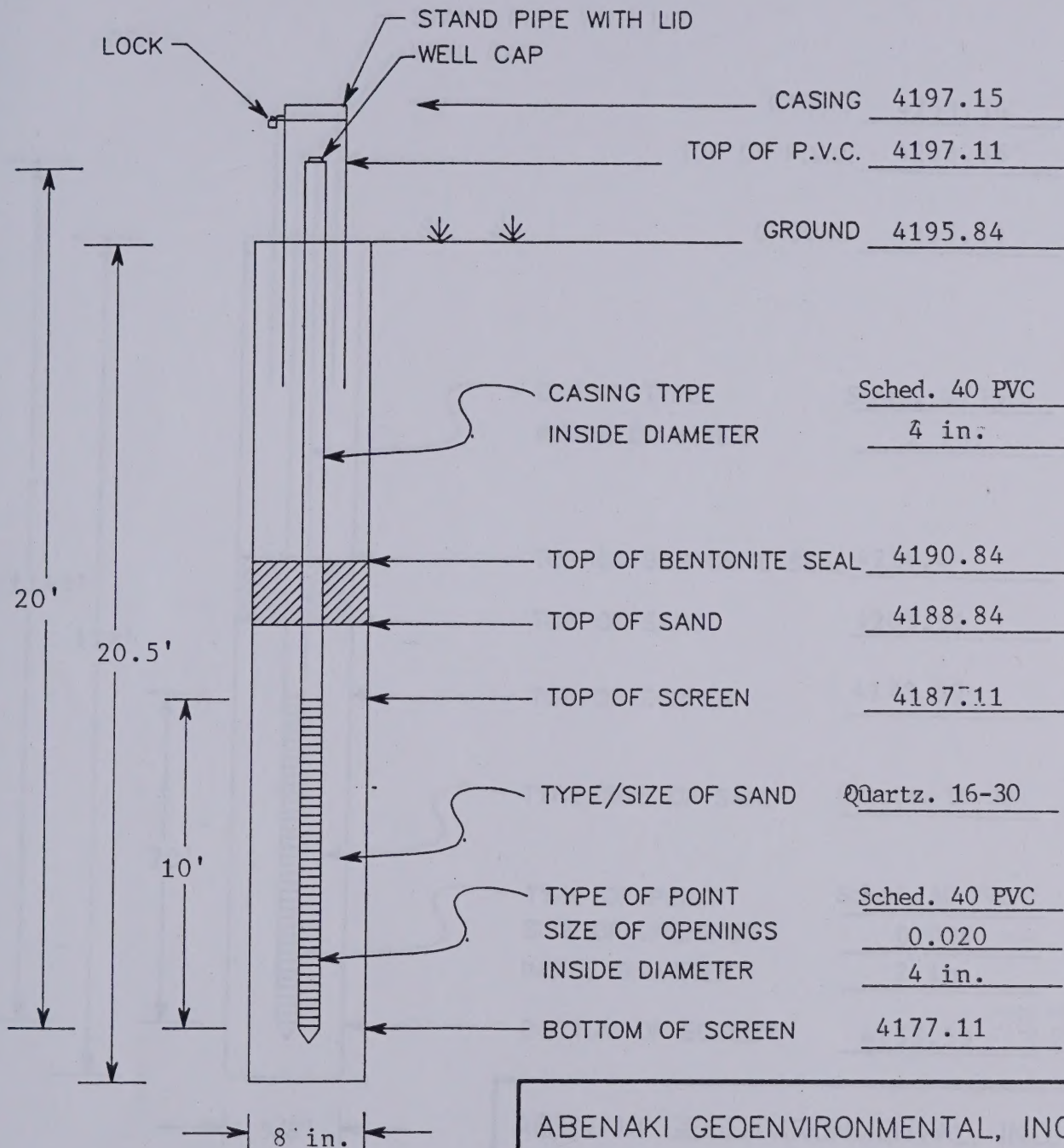
GROUND WATER OBSERVATION WELL COMPLETION PROFILE

WELL NO.: MW-4

OBSERVED WATER SURFACE ELEVATION: N/A

DATE: 6/93

DISTANCE BELOW GROUND: NFGWE



ABENAKI GEOENVIRONMENTAL, INC.

PROJECT: Mister M

PROJECT NO.: 579-03

LOCATION: Lewistown, MT

DRILLING DATE: 6-16-93

COMPLETION DATE: 6-16-93

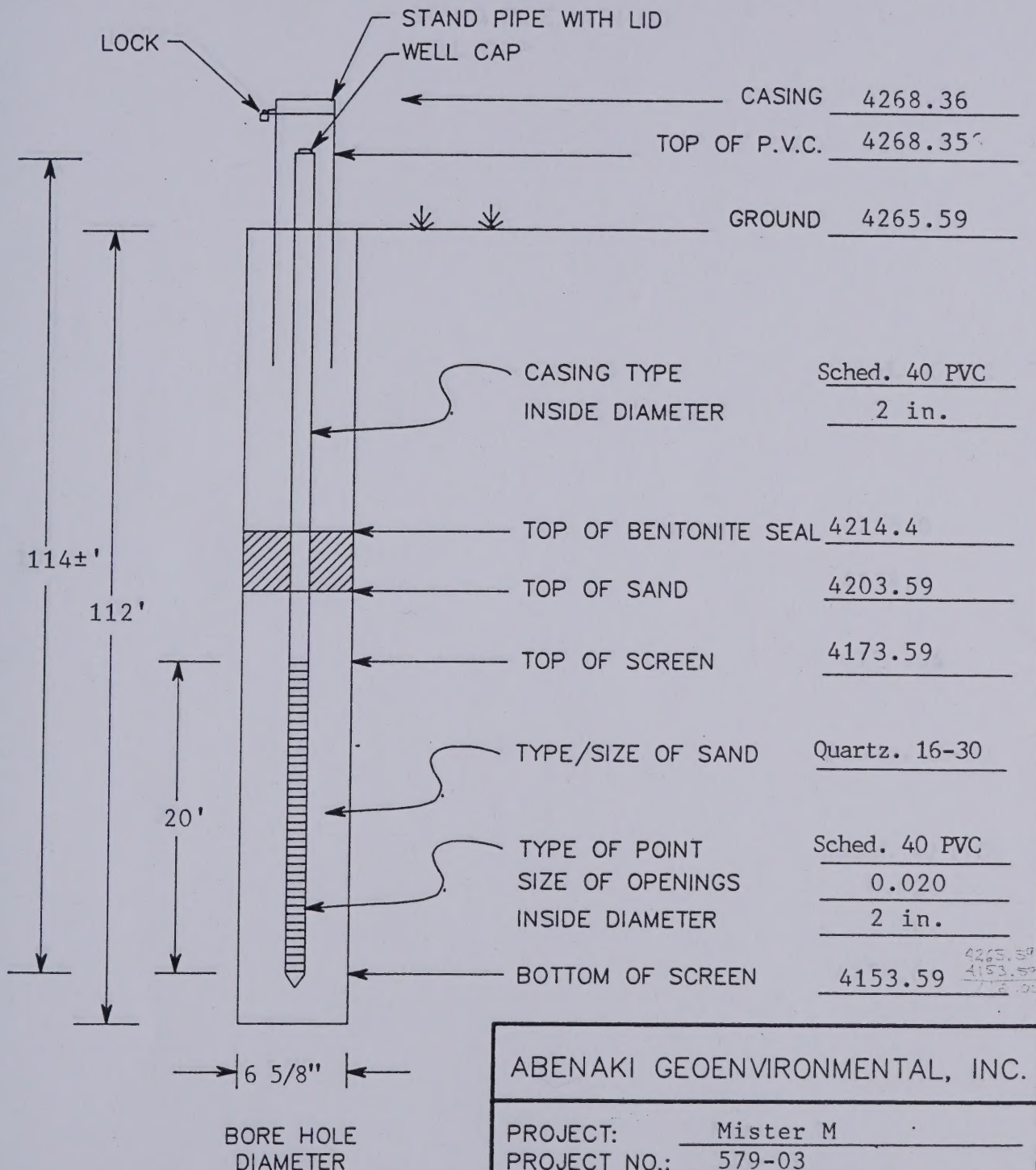
GROUND WATER OBSERVATION WELL COMPLETION PROFILE

WELL NO.: MW-5

OBSERVED WATER SURFACE ELEVATION: N/A

DATE: 6/93

DISTANCE BELOW GROUND: NFGWE



ABENAKI GEOENVIRONMENTAL, INC.

PROJECT: Mister M

PROJECT NO.: 579-03

LOCATION: Lewistown, MT

DRILLING DATE: 6-16-93

COMPLETION DATE: 6-16-93

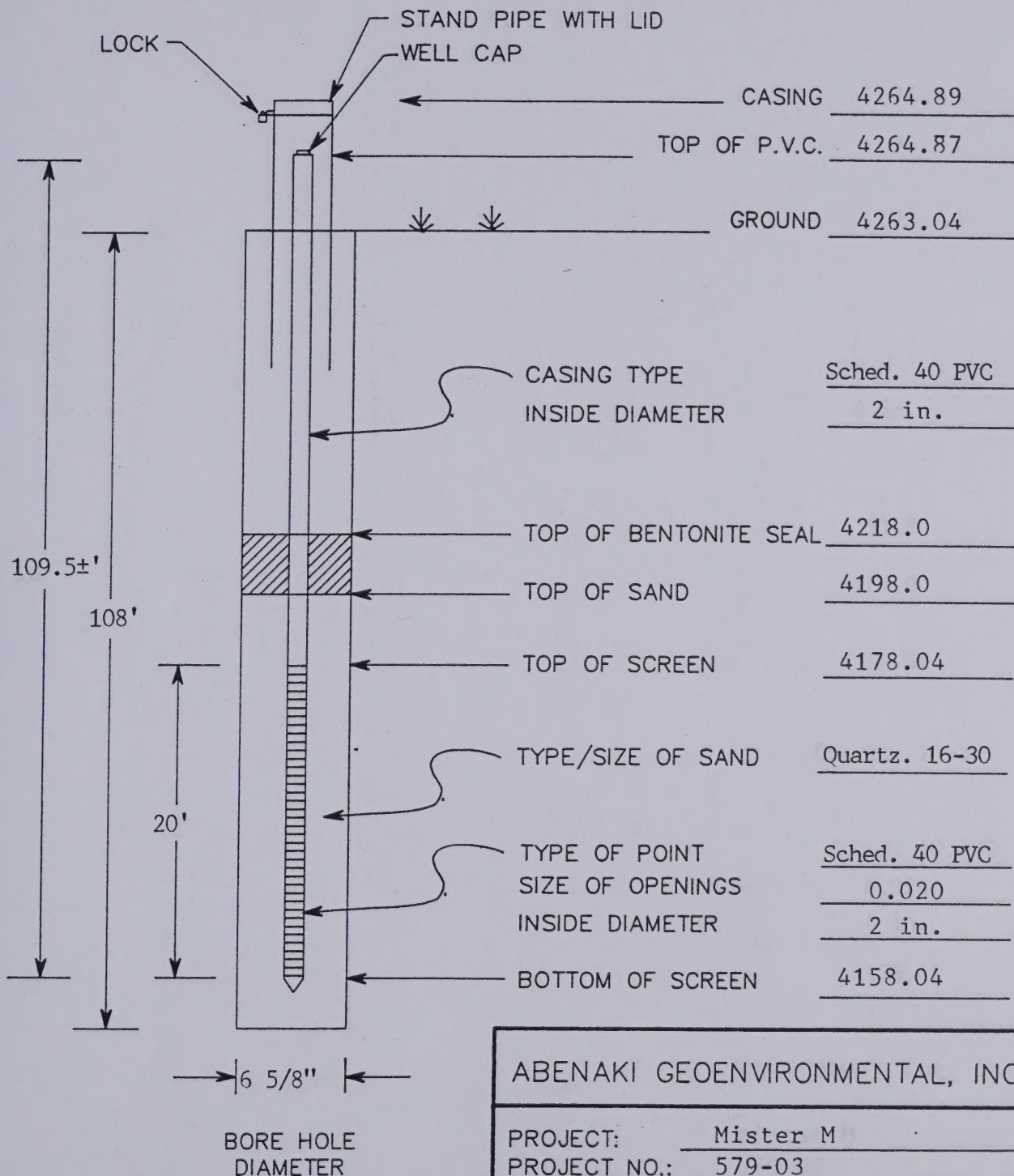
GROUND WATER OBSERVATION WELL COMPLETION PROFILE

WELL NO.: MW-6

OBSERVED WATER SURFACE ELEVATION: N/A

DATE: 6/93

DISTANCE BELOW GROUND: NFGWE



ABENAKI GEOENVIRONMENTAL, INC.

PROJECT: Mister M

PROJECT NO.: 579-03

LOCATION: Lewistown, MT

DRILLING DATE: 6-16-93

COMPLETION DATE: 6-16-93

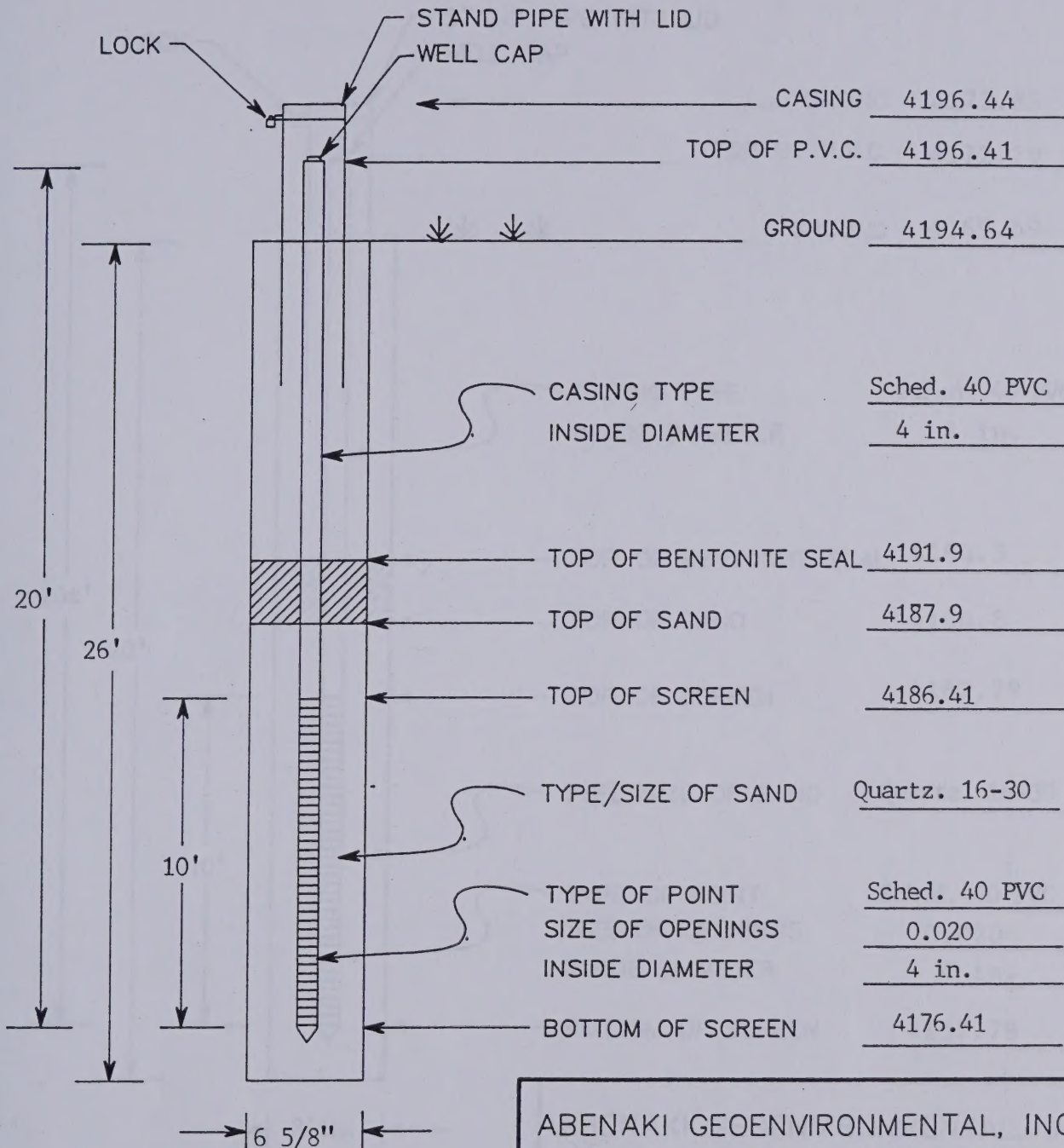
GROUND WATER OBSERVATION WELL COMPLETION PROFILE

WELL NO.: MW-7

OBSERVED WATER SURFACE ELEVATION: N/A

DATE: 6/93

DISTANCE BELOW GROUND: NFGWE



ABENAKI GEOENVIRONMENTAL, INC.

PROJECT: Mister M

PROJECT NO.: 579-03

LOCATION: Lewistown, MT

DRILLING DATE: 6-16-93

COMPLETION DATE: 6-16-93

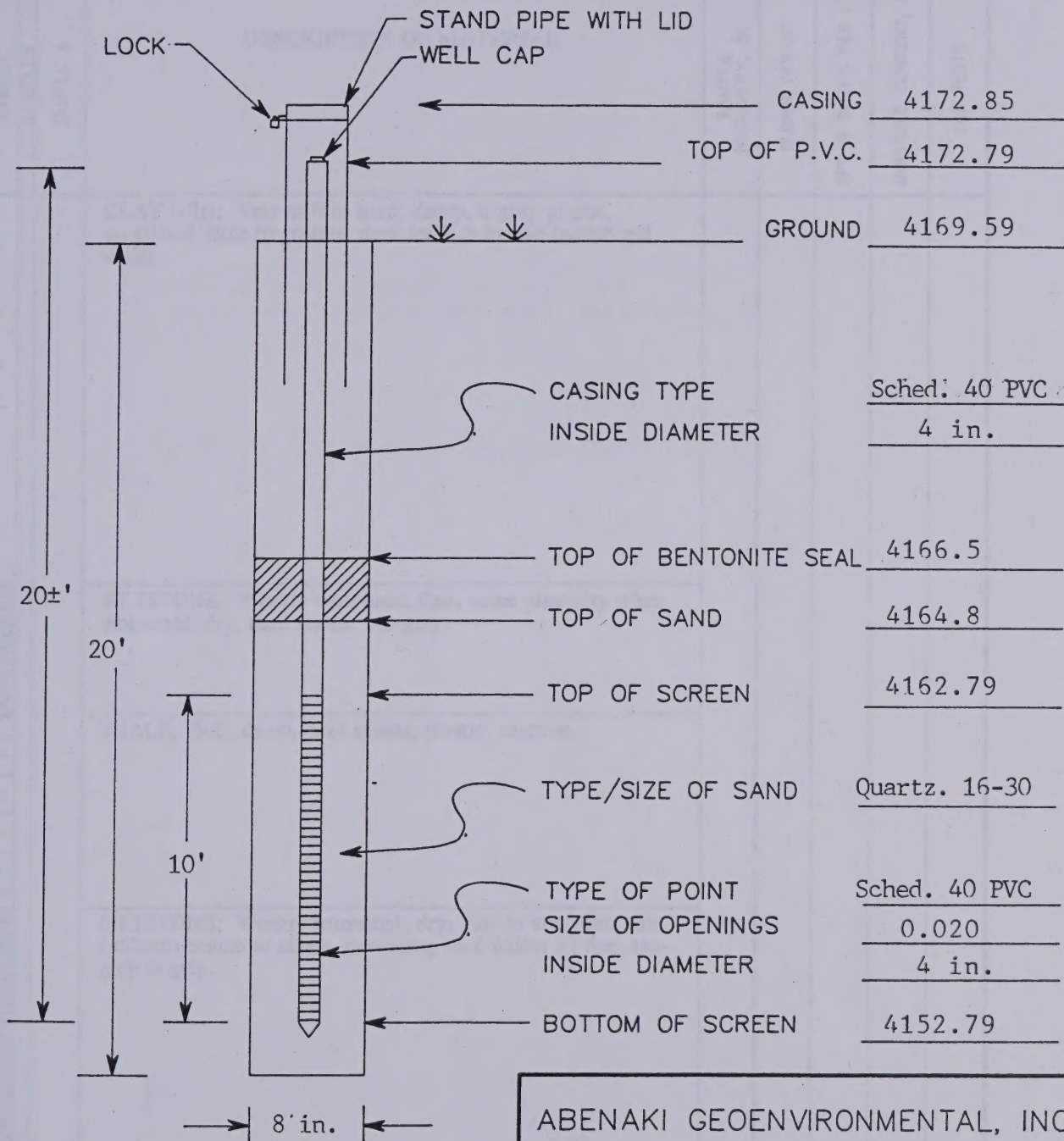
GROUND WATER OBSERVATION WELL COMPLETION PROFILE

WELL NO.: MW-8

OBSERVED WATER SURFACE ELEVATION: N/A

DATE: 6/93

DISTANCE BELOW GROUND: NFGWE



ABENAKI GEOENVIRONMENTAL, INC.

PROJECT: Mister M

PROJECT NO.: 579-03

LOCATION: Lewistown, MT

DRILLING DATE: 6-16-93

COMPLETION DATE: 6-16-93

TEST BORING LOG MW-9

Project: Mister M Landfill
Location: Lewistown, Montana
Client: Mister M, Inc.

Approximate Surface Elevation: 4176.8
Ground Water Depth: NFGWE
Date: 10-14-94

Project No. 579-03

Sheet No. 7 of 14

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT, %	LAB TESTS
0				CLAY (CH); Very stiff to hard, damp, highly plastic, occasional shale fragments, dark reddish-brown (weathered shale).					
5									
10									
15				SILTSTONE; Weakly cemented, fine, some plasticity when moistened, dry, hard seams, tan-gray.					
20				SHALE; Soft, damp, hard seams, plastic, maroon.					
25				SILTSTONE; Weakly cemented, dry, fine to very fine, thin (<2mm) bentonite seams, becoming hard below 27 feet, tan-gray to gray.					
30									

Robert W. Gillespie, P.E.
Lewistown, Montana

TEST BORING LOG MW-9

Project: Mister M Landfill
Location: Lewistown, Montana
Client: Mister M, Inc.

Approximate Surface Elevation: 4176.8
Ground Water Depth: NFGWE
Date: 10-14-94

Project No. 579-03

Sheet No. 8 of 14

[illegible]

Robert W. Gillespie, P.E.
Lewistown, Montana

TEST BORING LOG MW-10

Project: Mister M Landfill
Location: Lewistown, Montana
Client: Mister M, Inc.

Approximate Surface Elevation: 4193.3
Ground Water Depth: 40'
Date: 10-14-94

Project No. 579-03

Sheet No. 9 of 14

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT, %	LAB TESTS
0				FILL; Weathered shale, stiff, damp, some hard fragments, red-brown.					
5									
10									
15				SHALE; Soft, damp, plastic, hard fragments, red-brown with gray streaks.					
20									
25				BENTONITE; Soft, damp, highly plastic, shale seams below 37 feet, gray to maroon-gray.					
30									

Robert W. Gillespie, P.E.
Lewistown, Montana

TEST BORING LOG MW-10

Project: Mister M Landfill
Location: Lewistown, Montana
Client: Mister M, Inc.

Approximate Surface Elevation: 4193.3
Ground Water Depth: 40'
Date: 10-14-94

Project No. 579-03

Sheet No. 10 of 14

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT, %	LAB TESTS
35	++								
40	++								
45	++			SHALE; Soft, damp, plastic, hard fragments, red-brown with gray streaks.					
50	++								
55	++++			SANDSTONE; Moderately hard, very fine, silty, tan-gray, trace to little free water.					
60	++			SHALE; Soft, damp, plastic, hard fragments, red-brown with gray streaks.					
65	++			Bottom of Exploration at 61 feet.					

Robert W. Gillespie, P.E.
Lewistown, Montana

File No.

QUINTUPLICATE

LOG

Top of Ground

(Elev. above sea level.....)

0	20	Railroad fill
20	30	Red Bed shales
30	45	Yellow sandstone
45	50	Red shale and rock
50	60	Yellow sandrock
60	75	White rock and clay
75	80	White sandstone
80	101	Red shale
101	105	White shale
105	107	White rock
107	109	Red shale
109	111	White sandstone
111	114	Variated white and red shale, hard
114	135	White sandstone water at 120'

STATE OF MONTANA
ADMINISTRATOR OF GROUNDWATER CODE
STATE WATER CONSERVATION BOARD

Notice of Completion of Groundwater
Appropriation by Means of Well

DEVELOPED AFTER JANUARY 1, 1962

(Under Chapter 237 Montana Session Laws, 1961, as amended)

Owner Gail Durling Address Lewistown, Mont.Driller George O. Singley Address Lewistown, MontanaDate of Notice of appropriation of groundwater NoneDate well started May 8, 1970 Date completed May 9, 1970Type of well Drilled Equipment used Rotary
(Dug, driven, bored or drilled) (Churn drill, rotary or other)Water use: Domestic ☒ Municipal ☐ Stock ☐ Irrigation ☐
Industrial ☐ Drainage ☐ Other ☐

Indicate on the diagram the character and thickness of the different strata met with in drilling, such as soil, clay, shale, gravel, rock or sand, etc. Show depth at which water is encountered, thickness and character of water-bearing strata and height to which the water rises in the well.

Size of Drilled Hole	Size and Weight of Casing	From (Feet)	To (Feet)	PERFORATIONS		
				Kind Size	From (Feet)	To (Feet)
7-7/8		0	21			
5-5/8		21	135			
	4" OD 41D PVC 200# test plastic			5/16" hole	100	135

N

Static Water Level for non-flowing well

35

.....feet

None

1. Name of donor	2. Amount	3. Date	4. Name of donee	5. Address of donee
Mr. J. Edgar Hoover	\$100.00	12/15/67	Mr. J. Edgar Hoover	Washington, D.C.

This is to certify that the above named donor has contributed the sum of \$100.00 to the Federal Bureau of Investigation for the purpose of maintaining its files and records.

Witness my hand and the seal of the Federal Bureau of Investigation this 15th day of December, 1967.

Special Agent in Charge

John Edgar Hoover

Director

100-1

100-1

1. Name of donor	2. Amount	3. Date	4. Name of donee	5. Address of donee
Mr. J. Edgar Hoover	\$100.00	12/15/67	Mr. J. Edgar Hoover	Washington, D.C.

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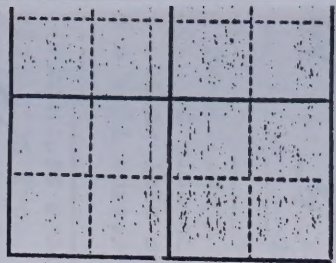
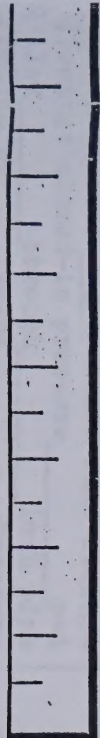
Special Agent in Charge

John Edgar Hoover

Director

100-1

100-1



NW 1/4 SW 1/4 Sec. 8 T15 R19

Indicate location of well and place of use, if possible. Each small square represents 40 acres.

Show exact depth of bottom.

This form to be prepared by driller, and three copies to be filed by the owner with the County Clerk and Recorder in the county in which the well is located, tissue copy to be retained by driller.

Please answer all questions. If not applicable, so state, otherwise the form will be returned.

"OFFICE" WELL

Shut-in Pressure for Flowing Well.....
Pumping Water Level.....⁶⁰ feet
at.....¹⁰⁰ gal. per minute.
Discharge in gal. per min. of flowing well
None
How Tested.....**Air**
Length of Test.....**1 hr. approx.**

Remarks: (Gravel packing, cementing packers, type of shutoff)
Casing sealed with Bentonite

19

Driller's License Number

Driller's Signature

5A

H

(11)

OF MONTANA

NATURAL RESOURCES AND CONSERVATION

WELL LOG REPORT

BW

(H)

This report shall be filed by the water well driller on or before the 15th day of the month of January, 1976 within ninety (90) days of completion of the well.

Name Marvin E. Hutzabo Address ATE 3 Four Towns 174.

WELL LOCATION: County Fergus Section SE 1/4 SW 1/4, Sec 8, Twp 15, R. 19

POPOSED USE: ☒ Domestic ☒ Stock ☐ Municipal ☐ Industrial ☐ Irrigation ☐ Other (if other, specify)

WELL CAPPED: ☐ Capped ☐ Bored
☒ Forward Rotary ☐ Reverse Rotary
☐ Drilled ☐ Other (if other, specify)

3. WELL LOG:

Depth (ft.)

From To

Format

0 80

80 120

Layers of yellow rock
Red shale & varietal
sandstone.

WELL Casing: 5 5/8 inches: Depth 120 ft.
Material: ☒ Plastic ☐ Concrete
☐ Welded ☐ Other (if other, specify)

Well Dia.: From 4 1/2 inches to 4 1/2 inches
Feet 120 feet
Feet 120 feet
Feet 120 feet

Is perforated pipe used? ☒ Yes ☐ No
If so, what depth? 40 feet
Is casing left open end? ☒ Yes ☐ No
Is a well screen installed? ☐ Yes ☒ No
Material: 40 inches

(stainless steel, bronze, etc.)
Screen type: 5/16 slots ☒ holes
Set from 80 feet to 120 feet
Set from 80 feet to 120 feet
Set from 80 feet to 120 feet
Is a packer or seal used? ☒ Yes ☐ No
If so, what material? Rubber

Well type: ☐ Straight screen ☐ Graveled
Is the well grouted? ☒ Yes ☐ No
If so, what depth? 40 feet
Material used in grouting: Cement
Well head completion: Pitless adapter ☒
" above grade ☐ Other ☐
If other, specify)
Is the well disinfected? ☒ Yes ☐ No

WATER LEVEL:
Static water level 40 ft. below land surface
Flowing: closed-in pressure psi
Flow through inch pipe
Controlled by: Valve Reducers
Other, specify

TEST DATA: ☒ Pump ☐ Bailer ☒ Other
If other, specify) air
Water level below land surface: 84 ft.
Flow rate: 2 gpm. pumping 25 gpm
Flow rate: 2 gpm. pumping 25 gpm

(Use separate sheet if necessary)

9. DATE STARTED: Feb 2, 197610. DATE COMPLETED: Feb 2, 197611. WAS WELL PLUGGED OR ABANDONED? ☐ Yes ☒ No
If so, how

12. DRILLER'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge.

George O. Hingley 19
Driller's or Firm Name License No.

ATE 2 Box 4 Four Towns 174.
Address

May 1976
Signed for

Shut-in Pressure for Flowing Well _____ feet
Pumping Water Level _____ feet

(H)

(11)

11

11-11-11

11-11-11

11-11-11

11-11-11

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11-11-11

11-11-11

DTWelev.T.D.

Office Well 35' 4145 4110

A Dick Katal ^{SE, SW} sec 8, T1S-R19E 180 4150 3970 180 (wtr) grey ss

B Mark Johnson SE, SE, NW sec 8, T1S-N-R19E 200' 4210 4010 280 grey fine sand ss + wtr
to north

C Jim Larson SW, NW, SW sec 8, T1S-N-R19E 70' 4130 4060 350 white ss + wtr
to west

D Ralph Bindal NE, NW sec 8, T1S-N-R19E 40' 4310 4270 220 sand (aquifer)
far north

E Ronald Denton N/2, SW, NE sec 8, T1S-N, R19E 146 4150 4004 244 top of sd
north-northeast

F Art Larsen SW, NW, SW sec 8, T1S-N-R19E 25' 4170 4145 320 light grey, hard ss + wtr
west-northwest

G Trace Sweeny SW, SW sec 8 T1S-N-R19E 60 4100 4040 297 white ss (wtr)
southwest

H Marvin M. Myala SE, NW, sec 8 T1S-N-R19E 40' 4120 4080 120 ss
northwest

ROUTE SLIP

DEPARTMENT OF HEALTH & ENVIRONMENTAL SCIENCES

TO:

Proof MW

DATE:

Feb 13, 1995

1.

Tom JD

2.

Roger per

3.

☐ Approval

☐ Comment

☐ Necessary Action

☐ Note and Return

☐ Note and File

☐ Investigate

☐ Prepare reply

☐ Signature

☐ See Me

☐ As requested

☐ For your information

☐ Per Conversation

REMARKS:

ASAP

FROM:

Pat



DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES

Waste Management Division
Solid Waste Program
406/444-1430

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE 2209 PHOENIX AVE.
LOCATION: HELENA, MONTANA

MAILING PO BOX 200901
ADDRESS: HELENA, MT 59620-0901

February 14, 1994

Marvin Mintyala
Mister M Disposal, Inc
HCR 85, Box 4066
Lewistown, MT 59457

Dear Mr. M:

Thank you for meeting with us on February 3, 1995. I think the meeting was productive and has all of us heading for a prompt resolution of the topics under discussion. At that meeting I promised to personally review the no-migration petition for the landfill and contact Mr. Gillespie by February 10, 1995. I called him on the 9th and discussed some of my ideas with him. I also told him that I would put the items he and I had discussed in a letter to you.

The Department continues to have problems granting total approval to the no-migration petition for the entire site, but will grant approval for the parts of the facility where there is no potential for the migration of hazardous constituents to the uppermost aquifer, provided that repeat sampling of the shop well and MW-10 for VOC's indicates that the initial results were truly in error.

Your landfill has basically three rock groups present. Most of the facility is in the Cretaceous Kootenai formation, which consists of interbedded shales, siltstones, and sandstones with poor continuity between many of the beds. The permeability of much of this formation is low according to the information presented by Mr. Gillespie. At the bottom of this formation is a water-bearing sandstone, which appears to be the 3rd Cat Creek Sandstone (a.k.a. the Lakota Sandstone). The "Office Well" appears to be completed in this sandstone. There is sixty feet of hydraulic head on this well.

Overlying the Kootenai Formation is what Mr. Gillespie calls the Cretaceous Fall River Sandstone. (This unit appears to correlate in central Montana with the 1st Cat Creek Sandstone and the Dakota Sandstone of eastern Montana.) It overlies the Kootenai and covers the eastern ¼ of the property. It has much higher permeability and could serve as a leachate pathway.

The last formation on the property is the sands and gravels of Quaternary age that is present as a small remnant on the hill, in

Mr. M. no-migration letter
February 14, 1995
Page two

the old railroad right-of-way, and in the valley floor. These very permeable units contain an aquifer in the valley.

Only the portion of the landfill that does not contain the last two units (the Fall River Sandstone and the Quaternary sands and gravels) can be included in the no-migration area at the landfill. Fortunately, this is the vast majority of the landfill.

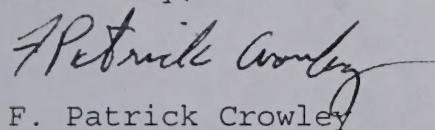
I understand from my conversation with Rob that a conceptual development plan will be presented to the Department in the near future. We feel that this plan will enable all parties to have a clearer understanding of the direction that the landfill is heading. Such plans are invaluable in providing proper coordination and sequencing of operations at the landfill. Detailed engineering can then be provided as needed, rather than having to do all of the work up front.

We also concur with the three recommendations of Mr. Gillespie on page six of the December 27, 1994 Addendum. I have one technical note on item 2. The VOC's should use EPA method 8260, a method outlined in EPA SW-846, rather than EPA method 624. 8260 is the analysis method previously used at these wells. Although the landfill does not have an approved Sampling and Analysis Plan (SAP), these wells can be sampled providing the requirements of ARM 16.14.706 and EPA SW-846 are met. In the event that these wells do not test clean and future monitoring will be required, a facility specific SAP will have to be developed.

I hope this letter clarifies the ground water monitoring situation at the landfill. In the course of my review of all of the information presented, it seems that both Rob and Patricia were saying about the same thing. They seem to both agree that there is some concern over the initial sampling, but with some additional information, a firm case for a no-migration petition could be made for most of the landfill. I agree, and we hope that you do too.

I would like to thank Rob for faxing me the initial test results. I would also like to thank you for your cooperation in this matter. If you have any further questions on this subject, I will be in Lewistown on February 22 and 23 at the Yogo Inn.

Sincerely,



F. Patrick Crowley
Solid Waste Regulatory Lead

cc:Rob Gillespie, P.O. Box 1730, Sanford, ME 04073

File:Mr. M. landfill\ground water

Path:H:\cb5403\wp\landfill\enforce\MrM\nmp.214

ROUTE SLIP

DEPARTMENT OF HEALTH & ENVIRONMENTAL SCIENCES

TO: *Proof NW 1-31*

DATE: *1/31/95*

1. *Pat C. Pte*

2. *Jon D. JD*

3. *Roger T. Pte Dayna DOS*

☒ Approval

☐ Comment

☐ Necessary Action

☐ Note and Return

☐ Note and File

☐ Investigate

☐ Prepare reply

☐ Signature

☐ See Me

☐ As requested

☐ For your information

☐ Per Conversation

REMARKS:

sw/fergus mm. rej

FROM: *p*³



DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES

Waste Management Division
Solid Waste Program
406/444-1430

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE 2209 PHOENIX AVE.
LOCATION: HELENA, MONTANA

MAILING PO BOX 200901
ADDRESS: HELENA, MT 59620-0901

February 3, 1995

Marvin Mintyala
Mister M Disposal
HCR 85, Box 4066
Lewistown, Montana 59457

RE: **MISTER M DISPOSAL, FERGUS COUNTY - LICENSE NO. 302**
REVIEW OF THE ADDENDUM TO SITE CHARACTERIZATION, DATED DECEMBER
27, 1994, AND THE REQUEST FOR A NO-MIGRATION PETITION, REJECTED

Dear Mr. Mintyala:

It is with the evidence from the analytical data from the initial ground water sampling event (i.e., prior to December 29, 1994) at both the Office Well and monitoring well MW-10 that the Department must reject your request for a no-migration petition at the Mister M Disposal facility. After many months of research and field investigation on your part, serious concerns must be raised by the Department with regard to the possible impacts to the deep drinking water aquifer from the landfill. Direct evidence of these impacts was detected in the initial sampling event involving the Office Well and monitoring well MW-10.

At this time, the Department is reluctant to comment on the specific results as we have not seen copies of the analytical data sheets for this initial sampling event, nor are we completely clear on the sampling procedure and protocol used for the sample collection. However, the Department must emphasize that the five reported volatile organic compounds (VOCs) detected in the Office Well and MW-10, are common VOCs found at many leaking landfills. Whether these constituents are directly related to leachate migration and/or a product of landfill gas condensation, is moot at this time. These chemical constituents have been detected in the drinking water aquifer (i.e., the Office Well), as well as in a shallow sandstone ground water-bearing zone (i.e., MW-10).

The explanation posed in the report as to these particular VOCs being formed in the sample vials due to exposure to ultraviolet light does not appear to be applicable in this case. The scenario

alluded to in the report refers to water that has been treated, such as from a water treatment plant. Exposure to ultraviolet light in this situation, could break down the treated water to form a variety of trihalomethanes such as chloroform, none of which have been mentioned in the report. Please submit copies of all laboratory analytical data to the Department for their files and for necessary review.

Additional ground water sampling will be required at this site. Therefore, in order to be protective of human health and the environment, ground water monitoring of the deep drinking water aquifer and any shallow ground water-bearing zones encountered in any of the existing monitoring wells will be required to be sampled at the Mister M Disposal facility.

Ground water monitoring at this facility will consist of checking all of the monitoring wells (and methane probes) for ground water accumulation on at least a semi-annual basis. These results/measurements will be required to be submitted to the Department [see, ARM 16.14.706(4)(a)]. An approved ground water monitoring network will be required according to ARM 16.14.704(1) and 704(2). This requires a solid waste facility to have a minimum of two background wells (possibly one will suffice if an adequate demonstration can be made to show that the appropriate statistical methodology can be accomplished using one well), and two down gradient monitoring wells. In the specific case of the Mister M Disposal site, even though the definition of "monitoring well" [see, ARM 16.14.702(33)] does not include supply wells, due to the excessive depth (180 to over 200 feet) of the drinking water aquifer at this site, the Department would consider using the Office Well, the Mintyala Well, and MW-10 as down gradient sampling points, if that is agreeable to you and your consultant.

The closest up gradient supply well(s) would be off-site to the north, and apparently access for sampling has not been permitted to date. Therefore, the monitoring wells that were completed above the drinking water aquifer (i.e., MW-5 and MW-6), should be deepened (if possible) to penetrate the deep drinking water aquifer for the purpose of characterizing natural background water quality in the area before it reaches and/or passes beneath the landfill. Therefore, until background water quality can be satisfactorily established in the deep drinking water aquifer in this area, the Department will have to assume that based on the VOCs detected in the ground water samples initially at the Office Well and MW-10, it is the solid waste facility that is impacting the natural quality of the drinking water aquifer in the area hydraulically down gradient from the landfill.

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February 3, 1995

Semi-annual sampling and analysis for the Table 1 (ARM 16.14.706) list of parameters/constituents will be required at the following wells/monitoring wells: Office Well, Mintyala Residence Well, MW-10, and background monitoring well(s) that are mutually agreeable to both Mister M and the Department, as being a valid representation of background water quality in the aquifer.

If a sufficient amount of ground water is found in any of the other wells/probes, this water should be collected and sampled for the VOCs on Table 1 (ARM 16.14.706) and all additional constituents on that table, as available water volumes will allow.

I realize this has been a long expensive project for you, with only bad news as a final result. If, in fact, the VOCs detected in the initial sampling event at the Office Well and MW-10 were anomalies or erratics of some sort, additional sampling will verify their non-existence. However, until such time as this is possible, semi-annual sampling as discussed above will be a necessity at the Mister M Disposal site.

If you, or your consultant has difficulty in using the two supply wells as temporary down gradient ground water monitoring points, please mention this promptly, as the Department will then have to require monitoring wells be installed into the drinking water aquifer to collect completely appropriate samples. Bear in mind, that if impacts to the ground water are observed in any of these alternative sampling locations (i.e., supply wells), additional monitoring wells may be required in the future.

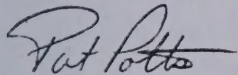
Also, be aware that for regular ground water monitoring and sampling at solid waste facilities, a Sampling and Analysis Plan (SAP) will be required according to ARM 16.14.706(1). The SAP must be approved by the Department prior to commencing regular ground water sampling. The Department strongly encourages Mister M Disposal to prepare for a Spring 1995 ground water sampling event scheduled to correspond with local high ground water levels in the area (probably May or early June).

A technical issue that should be addressed in greater detail involves the completion of monitoring well MW-9. Please provide the rationale for the screened interval in MW-9. The screen appears to be below the sandstone which could be a possible leachate conduit. The sandstone was logged from 37 to 42 feet below ground surface (BGS), and the top of the screen is reported to be at 41.99 feet BGS in MW-9.

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Thank you for your time and patience throughout this entire project.
If you have any questions please give me a call.

Sincerely,



Pat Potts
Environmental Specialist

cc: Robert W. Gillespie, P.E., P.O. Box 876, Lewistown, MT 59457

City of Lewistown, 305 Watson Street, Lewistown, MT 59457

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Lewistown, MT 59457-2562

Dayna Shepherd, Solid Waste Attorney

path: sw\fergmm.rej

file: Fergus Co./Mister M Disposal/grd wtr (corr)

County Closed Forges

Facility & # Mr. M #302

Closure

Landfarm

Finan Assur

Liner

GW Corr Meas

Methane

GW Monitoring

O & M

GW Reports

Run-on

Inspections

Other: _____

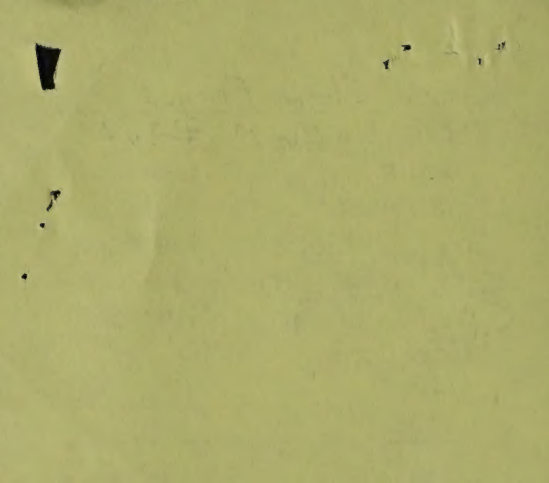


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Prepared By:

Montana Department of Environmental Quality

Solid Waste Section

May 2009

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1.0 INTRODUCTION

This document is the Sampling and Analysis Plan for Groundwater and Methane Monitoring at the closed Mister M Landfill, License #302, in Lewistown, Fergus County, Montana. As required by the Administrative Rules of Montana (ARM) 17.50.531(1)(a) groundwater and methane monitoring must be conducted throughout the post closure care period of all Class II landfills. The Groundwater Monitoring Sampling and Analysis Plan must be prepared to meet the requirements of ARM 17.50.708(1) and must be updated at least every ten years for closed facilities as required by ARM 17.50.709(b)(iii). A Methane Monitoring Plan is required by ARM 17.50.509(2)(j) and must meet the requirements of ARM 17.50.511(1)(g). These plans must be approved by the Montana Department of Environmental Quality (MDEQ), Solid Waste Section and placed in the operating records of the facility.

2.0 SITE DESCRIPTION

2.1 SITE LOCATION

Mister M Landfill is in Fergus County approximately four miles east of Lewistown on US Highway 87, as shown in Figure 1. The facility is located in Township 15 North, Range 19 East, Section 8, at 7 Boyd Creek Road on a 48.974 acre parcel, and is owned by Marvin and Sandra Mintyala. As shown in Figure 2, the landfill lies in a small south facing coulee which drains to Boyd Creek. The landfill operations were conducted primarily on the 30 acres of the parcel that lie to the north of the old railroad grade.

2.2 SITE HISTORY

Waste disposal at the site began in 1956 and the property was purchased by the current owners in 1974. The State of Montana first issued the facility a solid waste disposal license in 1979. From 1990 to 1997 the facility actively operated under Class II landfill license #302. The waste stream was typical municipal solid waste; including paper, plastics, some household metals, and seasonally some woody debris and brush. White goods and ferrous and non-ferrous metals were accepted and stockpiled at the site for transfer to scrap dealers. The facility stopped receiving

wastes by September 15, 1998, and was granted interim closure status on December 5, 2000. Final closure of the site has not been granted due to outstanding obligations of the owners.

2.3 SITE HYDROGEOLOGY

According to the Geohydrologic Characterization (Gillespie, 1993 revised; and Gillespie, 1994) the landfill is underlain by the Kootenai Formation, which consists of predominately shale with some silty sandstone. A basal unit of sandstone in the Kootenai formation is the uppermost aquifer in the area. Minor amounts of water have been encountered in the upper portions of the Kootenai Formation but the monitoring wells completed at the site have generally been dry since their installation, or contained minimal volumes of water. Due to the transient nature of water in these wells, the groundwater flow direction in the upper portion of the Kootenai is undetermined but likely is similar to that in the basal sandstone aquifer. The office well, house well, and other residential wells in the area are completed in the basal sandstone unit of the Kootenai Formation and indicate a general direction of groundwater flow in this unit to the southwest. The lack of monitoring wells or piezometers in the uppermost aquifer prevent a thorough evaluation of groundwater flow at the site.

Previous groundwater sampling at the facility was conducted by the owners or their consultants from 1993 to 1999 (Gillespie, 1995 and 1996; Energy Laboratories, 1997, 1998 (1), and 1998 (2); and Portage Environmental, 1999 and 2000). From 2003 to 2007 Tetra Tech, Inc was authorized by the MDEQ to conduct groundwater monitoring in the absence of action by the owners (Energy Laboratories, 2003, 2004, 2005, 2006, and 2007; Maxim, 2005; Tetra Tech, 2006 and 2008). MDEQ began conducting groundwater and methane monitoring at the facility in January 2009 (MDEQ, 2009). The quality of the groundwater data from 1993 to 1999 is questionable due to inconsistent and non-standard sampling practices. The monitoring wells are frequently dry and have a limited volume of water when present, and the deeper wells that are completed in the uppermost aquifer are water supply wells not monitoring wells. These factors impart variability to the analytical data which must be considered when analyzing groundwater quality at the facility.

Groundwater at the facility typically exhibits a neutral to slightly alkaline pH between 7 and 8 and specific conductance (SC) between 600 and 700 $\mu\text{mhos/cm}$. Nitrate + nitrite is generally present in the shallower monitoring wells at concentrations of 1 to 3 mg/l, but not detected in the deeper wells. The concentrations of chloride, sulfate, and chemical oxygen demand (COD) are highly variable. The metals that are commonly detected at the facility are barium and zinc in all wells, iron in the deeper wells, and selenium in the shallower wells. Several volatile organic compounds (VOCs) have been detected in the facility wells, but have generally been at or near the reporting limit with the exception of cis-1,2-dichloroethene and vinyl chloride in the Office Well (MW-OW).

2.4 SITE ACCESS

On December 2, 2002 the MDEQ received permission from the owners' representative, Mr. Timothy O'Hare, to access the site to conduct post closure care activities in the absence of the owners. Access to the site is controlled by a locked gate at the entrance. Access to the monitoring wells is controlled by locked caps. The keys to the locks can be obtained from the MDEQ, Solid Waste Section.

3.0 GROUNDWATER MONITORING PLAN

3.1 OBJECTIVES

The objective of this Groundwater Monitoring Plan is to describe the groundwater monitoring program for the Mister M facility as required in ARM 17.50.708(1). This includes describing the schedule of monitoring, the locations and parameters that will be monitored, the field procedures that will be followed during sampling, and how the resulting data will be analyzed and reported. The facility is currently in detection level monitoring, the goal of which is to detect statistically significant changes in water quality parameters that may indicate a release of contamination from the landfill to groundwater.

3.2 SCHEDULE

As required ARM 17.50.708(4)(a) groundwater monitoring at the facility will be conducted on an semi-annual basis. Samples will be collected each year in May or June, when groundwater levels should be higher due to the spring snowmelt. The second sampling event will be conducted in November or December.

3.3 NOTIFICATION

ARM 17.50.708(1)(a)(iv)(G) requires that the MDEQ, Solid Waste Section be notified prior to each sampling event. This notification provides the opportunity for the MDEQ, Solid Waste Section to observe the sampling methods and/or to collect split samples. If sampling is not being performed by MDEQ personnel, written notification will be provided to the MDEQ, Solid Waste Section at least fourteen days prior to sampling in the form of a letter, e-mail, or fax.

3.4 FIELD PROCEDURES

The following field procedures will be used during each sampling event. Consistent and proper groundwater sampling methods and sample handling techniques are necessary to ensure that the analytical results are valid and legally defensible.

3.4.1 Monitoring Wells

There have been several monitoring wells installed at the facility, however, due to poor record keeping and well maintenance, location and identification of the monitoring wells is problematic. The monitoring wells that have been located and their tentative identifications are shown in Figure 3. MW-5 is up-gradient of the landfill and MW-6 is cross-gradient. All other wells are down-gradient of the landfill area. The point of compliance wells are MW-10R, MW-9R, and the MW-OW. During each sampling event all of the monitoring wells will be inspected as required in ARM 17.50.724(2) and any damage will be reported in writing to the MDEQ within ten days. If non-dedicated or non-disposable sampling equipment is used, the monitoring wells will be sampled in the following order, if water is present: House Well (MW-HW), MW-5, MW-9R, MW-10R, and MW-OW. QA/QC samples including an equipment blank and field duplicate will be collected during each sampling event as described in Section 5.1.4.

3.4.2 Monitoring Parameters

In accordance with the requirements for a detection monitoring program, the monitoring wells at the Mister M facility will be sampled for all of the parameters listed in ARM 17.50.708 Table 1, which is reproduced in this document in Table 1. The VOCs samples will be collected first, followed by cyanide second; nitrate + nitrite and COD third; chloride, sulfate, pH, and SC fourth; and finally dissolved metals. In addition, pH, SC, and temperature will be measured in the field following well purging as required by ARM 17.50.708(7).

3.4.3 Water Level Measurements

The static water levels in wells MW-5, MW-9R, MW-10R, and MW-OW will be measured prior to each sampling event. The static water level in MW-HW will not be measured due to the well's construction as a water supply well. Static water levels will be measured to the nearest 0.05 feet as required in ARM 17.50.708(5) using a decontaminated electric water level probe. The water level probe will be tested and then lowered into the well until the probe indicates that water has been encountered. The water level probe will then be raised out of the water and lowered back to the air-water interface slowly for a precise measurement of the water level. This depth will be double-checked to ensure accuracy. The reference point for the water level

measurements will be the north side of the inner well casing unless otherwise marked. All water level measurements will be recorded on the Water Level Measurement Form included in Appendix A.

3.4.4 Monitoring Well Purging

Each monitoring well will be purged prior to sampling to ensure that the samples collected are representative of groundwater and not stagnant water in the well bore. The well purging procedures for this facility vary due to the well construction details and the volume of water present in the wells. The wells will be purged with a non-dedicated decontaminated submersible pump if possible; otherwise a new disposable polyethylene bailer will be used. MW-HW has a permanently installed pump and is purged and sampled from a frost-free spigot near the house. The Monitoring Well Purging and Sampling Form included in Appendix A will be completed for each well that is sampled.

Prior to purging, the static water level and total depth of the well will be measured. Static water level will be measured at all wells except MW-HW as described in Section 3.4.3 and recorded. The total depth of the well will be measured at MW-5, MW-9R, MW-10R, and MW-OW by sounding the well with the water level probe. To sound the well, the water level probe will be turned off and lowered into the well until the reduction of tension on the tape indicates that the probe is at the bottom of the well. This depth will then be recorded and corrected for the distance between the probe electrode and the bottom of the probe. The volume of water in the well will then be calculated using the following formula:

$$\text{Well Volume (gal)} = [\text{Total Depth (ft)} - \text{Static Water Level in (ft)}] * C$$

where C = 0.163 for a 2 inch well and 0.653 for a 4 inch well. The result will be recorded and multiplied by three to determine the volume necessary for purging as described below.

When using a submersible pump, the pump will be fitted with new disposable tubing and lowered into the well slowly until the desired depth is reached. The pump will be secured at this depth and the well will be purged at a rate not exceeding one gallon per minute. When a bailer is used, it will be lowered into the well and removed slowly so as to minimize the agitation of the water in the well. The bailer will not be allowed to touch the ground or any other object and will

only be handled with clean gloves when emptying. The volume of water purged will be measured by discharging the purge water into a vessel of known volume, such as a five gallon bucket. The field parameters of the purge water including pH, SC, temperature, dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity will be measured at least once per well volume, and no more frequently than once per half well volume. For monitoring wells MW-5, MW-9R, and MW-10R purging will continue until three well volumes have been removed and the field parameter readings have stabilized according to the criteria in Table 2. If a well is purged dry, it will be allowed to recover to 90% of the initial static water level or for a maximum of two hours and then sampled. Because MW-OW and MW-HW were constructed as water supply wells and not monitoring wells these wells will be purged until the stabilization criteria in Table 2 are met for three consecutive readings at least five minutes or five gallons apart, whichever is greater.

3.4.5 Sample Collection

After purging is complete the samples will be collected in the order listed in Section 3.4.2 and Table 3 using pre-cleaned bottles supplied by the laboratory. Each sample bottle will be labeled in the format: MrM-XXXX, where XXXX is the sample location identification. The Office Well and House Well will be abbreviated as MW-OW and MW-HW respectively. The labels for each sample bottle will also contain the date and time of collection, analyses requested, any preservation agents used, and the initials of the sampler. Table 3 shows the type and size of bottles, and the preservative that will typically be used for the samples. The bottle type and size may vary depending on what is supplied by the laboratory.

If the samples are collected using a submersible pump, they will be collected directly from the discharge tubing at a pumping rate of one quarter gallon per minute or less. At MW-HW the flow rate at the spigot will be reduced during sampling. If a water quality meter with a flow-through cell is used it will be disconnected prior to sampling. If the samples are collected using a bailer, they will be collected from the bottom of the bailer using a bailer draining device, not by pouring water out of the top of the bailer. All sample bottles will be filled slowly, so that the water entering the bottle does not produce turbulence or aeration. The preservative will be added to the VOCs vials before they are filled, and they will not be allowed to overflow. A small

amount of water placed in the vial cap will be used to complete the filling of the VOCs vials, producing a meniscus over the mouth of the vial. The cap will then be carefully fitted and the vial checked for air bubbles by inverting it and tapping the side. If air bubbles are present in the vial it will be opened, emptied, re-preserved, and a new sample will be collected as described above. All other samples will be collected by filling the bottles to a level slightly below the top, then adding the preservative as necessary. The dissolved metals samples will be field filtered using a disposable 0.45 micron filter attached directly to the discharge tubing or the outlet port of the bailer draining device. If insufficient water is available to collect all the samples they will be collected with the following priority: VOCs; nitrate + nitrite and COD; chloride, sulfate, pH, and SC; dissolved metals; and cyanide.

3.4.6 Shipping and Handling

All samples will be placed on ice in coolers immediately after collection, and will remain on ice or in a refrigerator at a temperature of $4\pm 2^{\circ}\text{C}$ until delivered to the analytical laboratory. To prevent freezing of the samples, in cold weather ice will not be used. The samples will be delivered to the laboratory by hand or via a shipping service either the same day or next business day after the completion of sampling. Chain-of-custody procedures will be followed as described in Section 5.1.5.

3.5 DATA HANDLING AND ANALYSIS

When the analytical data is received from the laboratory it will be checked for completeness and then validated as described in Section 5.3. The laboratory will be contacted if there is any missing data or to resolve any validation issues. After the data is validated, it will be entered into a database containing all groundwater data for the Mr. M facility in the format required for the statistical analysis.

3.5.1 Statistical Analysis

The purpose of statistical analysis for a facility in detection level monitoring is to identify any statistically significant increases over background levels that may indicate a release of contamination from the landfill. According to ARM 17.50.708(14)(a) the owner or operator

must determine if a statistically significant increase over background values has occurred by comparing the groundwater quality of each parameter to its background value at each point of compliance well.

For the shallow compliance wells (MW-9R and MW-10R), MW-5 is located up-gradient of the landfill and will be used to determine background levels. For the deep compliance well (MW-OW), MW-HW will be used as a substitute for a background well. Although MW-HW is cross-gradient to MW-OW, and down-gradient or cross-gradient to the landfill, data from previous analyses from MW-HW appear to represent natural groundwater conditions. Following each sampling event, the data from MW-HW will be evaluated using an intra-well analysis to determine if any significant changes in the water quality at this well have occurred. Any outliers identified by this analysis will be excluded when using the data from MW-HW as the background data for MW-OW.

The distribution of the datasets from the two background wells (MW-5 and MW-HW) will be determined for each parameter prior to performing the statistical analyses. If the data is determined to have a normal distribution, a parametric test will be performed on the data. If the data is determined to have a log-normal distribution, a parametric test will be performed using the transformed data. If the data is determined to have a non-normal distribution, a non-parametric test will be performed. For all parameters that are detected in the compliance wells, the data from the compliance wells will be compared to the appropriate background dataset using a tolerance interval analysis. If a parameter is detected at a statistically significant level above background, a non-parametric test for trend will be performed to assist in the determination if the exceedance represents a statistical outlier or a significant increasing trend. In addition, a historical concentration plot will be prepared for all parameters detected in compliance wells to help analyze temporal trends.

3.5.2 Reporting

Pursuant to ARM 17.50.708(15) the sampling results, groundwater elevation data, and any deviations from this Sampling and Analysis Plan will be reported to the MDEQ, Solid Waste Section within 90 days of sampling. This report will include copies of the field data sheets,

chain-of-custody documents, laboratory analytical report, and laboratory QA/QC report. This report will also include a determination of groundwater flow direction and seepage velocity, and the results of the statistical analysis.

4.0 METHANE MONITORING PLAN

4.1 OBJECTIVES

The objective of this Methane Monitoring Plan is to describe the methane monitoring program for this facility as required in ARM 17.50.511(1)(g). The objective of the methane monitoring program is to ensure that the concentration of methane gas does not exceed 25% of the lower explosive limit (LEL) in facility structures and does not exceed the LEL at the facility property boundary as required by ARM 17.50.511(1)(f). The LEL for methane is a concentration of 5%, thus 25% of the LEL is a concentration of 1.25%.

4.2 SCHEDULE

As required in ARM 17.50.511(g)(ii) the methane levels at the facility will be monitored quarterly. Methane monitoring will typically be conducted in March, June, September, and December, and will be combined with groundwater monitoring events when possible.

4.3 MONITORING LOCATIONS AND PARAMETERS

Methane monitoring will be conducted at four monitoring wells surrounding the facility; MW-1, MW-2, MW-5M, and MW-6M. In addition methane levels will be measured in the former office if possible, and in the passive methane vent installed on the northwest side of the cap. The locations for methane monitoring are shown in Figure 4. The concentrations of methane, oxygen, hydrogen sulfide, and carbon monoxide will be measured at all of the monitoring locations.

4.4 MEASUREMENT PROCEDURES

A handheld gas meter will be used to measure the concentrations of methane, oxygen, hydrogen sulfide, and carbon monoxide at each monitoring point. At the monitoring wells, measurements will be made in the well casing. In the former office, measurements will be made in a poorly ventilated area. At the gas vent the measurement will be made as far inside the vent pipe as possible. All gas measurements will be double-checked for accuracy. The measured methane,

oxygen, hydrogen sulfide, and carbon monoxide concentrations for each location will be recorded on the Methane Monitoring Form included in Appendix A.

4.5 REPORTING

The results of the methane monitoring will be reported to the MDEQ, Solid Waste Section. This report will contain copies of the field sheets and any observations made during monitoring. If the methane gas levels exceed the limits set in ARM 17.50.511(1)(f), the MDEQ Solid Waste Section will be notified as soon as possible. Notification in writing of the levels of the methane gas exceedance and a description of the measures taken to protect human health must be submitted to the MDEQ, Solid Waste Section within 7 days of detection, and an MDEQ approved methane gas remediation plan will be implemented within 60 days of detection.

5.0 QA/QC PLAN

5.1 FIELD PROCEDURES

This section describes the field QA/QC procedures that will be implemented during groundwater and methane monitoring to ensure that the data produced is valid and legally defensible.

5.1.1 Instrument Calibration

All field instruments used during groundwater and methane monitoring will be calibrated according to manufacturer specifications at the beginning of each day they will be used. Additionally, instrument readings will be compared to previous measurements at the same location to check for consistency. If at any time an instrument reading is considered suspect, the instrument will be recalibrated. The water quality meters will be calibrated to appropriate reference solutions for the parameters being measured, and the calibration will be documented on the Water Quality Meter Calibration Form included in Appendix A. The landfill gas meter will be calibrated to a methane reference standard, and the calibration will be documented on the Methane Monitoring Form included in Appendix A.

5.1.2 Equipment Decontamination Procedures

All non-disposable equipment that comes into contact with groundwater will be decontaminated between monitoring wells. The water level probe and water quality meter reservoir (container or flow-through cell) will normally be decontaminated by rinsing it with potable water. If visible contamination is noted (such as dirt, iron staining, or oily residues) then the equipment will be scrubbed with a soap solution prior to the potable water rinse. The module containing the sensors of the water quality meter will only be decontaminated by rinsing it with potable water or de-ionized water, as cleaning agents can damage the instrument's sensors. The submersible pump and flow control valve will be decontaminated by the following procedure:

1. Connect the pump to the valve with a short length of tubing
2. Pump approximately 2 gallons of soap solution
3. Pump approximately 10 gallons of potable water
4. Disconnect pump and valve

5. Rinse each (inside and out) with a 10% nitric acid solution

6. Rinse each three times with de-ionized water

For step 3 the second five gallons of potable water can be reused as the first five gallons during the next decontamination procedure. Potable water can be obtained from any drinking water source and should be stored in clean sealed containers. De-ionized water can usually be supplied by the laboratory.

5.1.3 Field Documentation

A field logbook will be kept to record the details of each sampling event. The field logbook will be a bound book with waterproof pages. Information that will be recorded in the field logbook for each event includes:

1. Date(s)
2. Personnel on site
3. Times of arrival and departure
4. Weather conditions
5. Details of activities conducted including time(s) and references to forms completed
6. Details of any variances from this SAP including the reason for the variance
7. Details of interactions with any persons while on-site (owners, neighbors, etc...) including contact information.

All entries in the field logbook will be made in waterproof ink. Each page of the field logbook should be signed and dated by the person or persons making the entries. Any mistakes or changes should be lined out and initialed.

In addition to the field logbook, all appropriate field forms from Appendix A will be completed during each sampling event. For the quarterly methane monitoring events a Methane Monitoring Form should be completed. For the semi-annual groundwater monitoring events a Monitoring Well Purging and Sampling Form for each well, a Water Quality Meter Calibration Form, and a Water Level Measurement Form should be completed. All forms should be filled in completely and signed by the person who completes it. If an entry on the form does not apply, it should be marked N/A and explained in the notes section if necessary.

5.1.4 Field QA/QC Samples

In order to verify data quality, field QA/QC samples will be collected during each groundwater sampling event. The QA/QC samples will include a field duplicate, an equipment rinsate blank, and trip blanks. The field duplicates and equipment rinsate blanks will be collected at a rate of one per twenty regular samples, or at least once per event. Trip blanks will be included with each shipment of samples that includes a regular sample for VOCs.

The field duplicate is collected to analyze the precision of the sampling and analytical methods. The duplicate sample will be collected at a location selected at random, provided sufficient water is present. If sufficient water is not present to collect the duplicate at the selected location, then it will be collected at the next possible location. The duplicate samples will be collected concurrently with the regular samples from the selected location. For example: 4 vials will be collected for VOCs instead of 2. Two will be labeled with the regular sample designation and two will include the suffix -DUP. For dissolved metals samples, the same filter should be used for both the regular sample and the duplicate sample. The field duplicate should be analyzed for all parameters that are monitored during the event.

The equipment rinsate blank is collected to detect possible contamination of the samples during the sampling process. The equipment rinsate blank should be collected after the equipment decontamination procedures are completed following the sampling of the location which typically exhibits the highest parameter values. The rinsate blank is collected by pouring deionized water over the sampling equipment into the sample containers. All sampling equipment that was used during the sampling event should be included in the rinsate blank. This includes pumps, tubing, valves, bailers, twine, and gloves. The dissolved metals rinsate blank should include the filter. For the disposable equipment, new equipment should be used for the rinsate blank. The equipment rinsate blank should be analyzed for all parameters that are monitored during the event.

The trip blanks are used to detect possible contamination of the samples during transport or by the analytical laboratory. The trip blanks are filled with deionized water by the analytical laboratory and included with the sample bottles. The trip blanks should remain with the sample

bottles at all times and should not be opened by the field personnel. The trip blanks are analyzed for VOCs only.

5.1.5 Chain-of-Custody Requirements

To produce evidence quality sampling data, the chain-of-custody of the samples must be maintained and documented from the time of sampling until receipt by the laboratory. The documentation of the chain-of-custody will be made on a Chain-of-Custody Form (COC) similar to the one included in Appendix A. The samples are considered to be in the custody of an individual if they are physically in their possession (i.e. within their field of view) or in secure storage (such as a locked vehicle). All of the samples should be listed on the COCs, and each sample bottle should be accounted for individually. If the samples are shipped by a commercial carrier, each cooler containing samples should be sealed with two signed custody seals, placed such that the cooler cannot be opened without destroying the seal. When properly sealed with signed custody seals, the samples are considered to be in the custody of the signer until the seal is broken. The COCs must be signed by the field personnel prior to relinquishing the samples for transport, signed by any transporters that have custody of the samples, and signed by laboratory personnel upon receipt.

5.2 ANALYTICAL LABORATORY QA/QC PROCEDURES

This section describes the minimum QA/QC procedures that the contracted analytical laboratory will follow to ensure that groundwater analytical results produced from each sampling event are valid and legally defensible.

5.2.1 Sample Receipt Procedures

Upon receipt by the laboratory the samples will be inventoried and compared to the COCs. Any differences between the COCs and the samples received will be resolved by contacting the sampling personnel. The samples will be checked for temperature compliance and any deficiencies will be noted. The preservation of the samples will be checked by testing pH when appropriate, and all deficiencies will be noted and corrected.

5.2.2 Sample Holding Time Requirements

To ensure valid analytical data, each analysis must be conducted within a specified holding time following sampling. The allowable holding times for all parameters are shown in Table 4.

5.2.3 Data Reporting Requirements

The laboratory analytical report should include the values for all parameters, including estimated values below the reporting limit. For each parameter any necessary qualifiers, the reporting limit, and the data and time of analysis should also be reported. The laboratory analytical report should also include the results of the internal laboratory QA/QC samples that are associated with the field samples. Copies of the sample log in sheets and COCs should also be included.

5.2.4 Laboratory Internal QA/QC Plan

The laboratory contracted to analyze the groundwater samples will have a written internal QA/QC plan that meets USEPA requirements for RCRA analytical laboratories.

5.3 DATA VALIDATION

All analytical data will be validated after receipt from the laboratory to ensure that the results are legally defensible. The validation process will be conducted by a qualified groundwater scientist and will include checks for proper sample preservation, holding time compliance, duplicate precision, control and spiked sample accuracy, and blank contamination.

The temperature at receipt by the laboratory will be checked on the laboratory sample log in sheet. If the temperature is greater than 6°C, or if frozen samples were received, the results will be flagged with a 'T' qualifier, indicating that the results are considered estimated due to non-compliant temperature. Samples that are hand delivered to the laboratory immediately after sampling will be accepted at greater than 6°C if there is evidence that cooling has begun. The pH of metals, nutrients, and cyanide samples will be checked on the laboratory log in sheet, and the pH of VOCs samples will be checked in the analytical report. Samples with a pH out of compliance by greater than two standard units will be flagged with a 'P' qualifier, indicating that the results are considered estimated due to non-compliant pH. If a non-compliant pH is

corrected by the laboratory within 24 hours of sample collection that sample will be considered compliant. If a VOCs sample is analyzed within seven days of sample collection the pH requirement does not apply.

Compliance with the holding time requirements for the samples will be checked by comparing the analysis date and time from the analytical report to the date and time the sample was collected. If the holding time is exceeded the results will be flagged with an 'H' qualifier, indicating that the results are considered estimated due to a holding time exceedance.

The relative percent difference (RPD) for duplicate sample pairs will be calculated to check duplicate precision. The RPD of both field and laboratory duplicates will be considered. If the RPD for a parameter is greater than twenty percent for results greater than five times the reporting limit, or greater than one reporting limit different for results less than five times the reporting limit, all associated results will be flagged with an 'P' qualifier, indicating that the results are considered estimated due to poor duplicate precision.

The results of laboratory control and spike samples will be reviewed in the laboratory QA/QC report. If the results for any parameter fall outside of the laboratory high or low limits the associated sample results will be flagged according to their bias. A 'K' qualifier indicates that the sample results may be biased high and an 'L' qualifier indicates that the sample results may be biased low. 'K' qualifiers will not be reported for non-detect values because the high bias is irrelevant. If the results for a single parameter both exceed the high limit and are less than the low limit in separate control or spiked samples the associated sample results will be flagged with an 'A' qualifier, indicating that the results are considered to be estimated due to poor accuracy of control and spiked samples.

The results of field and laboratory blanks will be reviewed in the laboratory analytical report, and any detections will be compared to the analytical results for the associated samples. If the sample results for any parameter fall within two times the value detected in an associated blank the results will be flagged with a 'B' qualifier, indicating that the parameter detection may be due to field or laboratory contamination and not representative of actual groundwater conditions.

6.0 HEALTH AND SAFETY PLAN

6.1 SITE HAZARDS

This section describes the hazards that may be generally encountered at the Mister M Landfill facility, as well as hazards specific to groundwater and methane monitoring activities, and the procedures that will be used by the field personnel to minimize the risks associated with these hazards.

6.1.1 General Hazards

The Mister M Landfill is closed, thus there are no hazards due to landfill operations. A significant amount of junk material is located throughout the facility, thus care should be taken when driving or walking the site. The structures on the site have not been maintained since closure and should be avoided when possible. Rattlesnakes are native to Montana and have been observed in Fergus County, although none have been reported at this site. General weather related hazards such as heat, cold, mud, dust, snow and ice, and lightning could also be encountered at the site.

6.1.2 Groundwater Monitoring Hazards

Wasps, bees, and spiders can be found in monitoring well casings, thus care should be taken when opening the wells. The twine used with bailers can cause injury to exposed flesh, thus work gloves should be worn when bailing. The pumps used in groundwater sampling are powered by a 12 volt battery and electrical shock could occur if handled improperly. In addition, 12 volt batteries contain sulfuric acid, thus care should be taken that the battery remains upright and is not punctured. The preservatives used in groundwater samples (sulfuric, nitric, and hydrochloric acid, and sodium hydroxide) are strong chemicals, and thus chemical resistant gloves should be worn at all times when handling the preservatives. The groundwater at the Mister M Landfill is generally not hazardous, although several parameters have exceeded groundwater protection standards. Under no conditions should groundwater from the site be ingested.

6.1.3 Methane Monitoring Hazards

Methane is a flammable gas and thus no open flames or spark producing devices should be used during methane monitoring activities. Care should be taken when opening methane monitoring wells to avoid possible sparks caused by metal-to-metal contact. The methane, oxygen, hydrogen sulfide, and carbon monoxide levels should be monitored continuously when entering facility structures for methane monitoring, and if oxygen levels below 18.5%, methane levels above 1.25%, hydrogen sulfide levels above 10 ppm, or carbon monoxide levels above 50 ppm are encountered the structure should be exited immediately. All structures should be entered using the buddy system, with one person remaining outside the structure but in visual or audible contact with the person entering the structure at all times. Under no conditions should any confined space be entered.

6.2 LEVEL OF PROTECTION

The general level of protection required at the Mister M facility is modified OSHA Level D. This level of protection includes:

1. Sturdy work boots
2. Long sleeved shirt and long pants
3. Work gloves

Additional personal protective equipment required during groundwater sampling includes eye splash protection and disposable chemical resistant gloves. Due to the lack of maintenance, a flashlight or headlamp and a hard hat should be used when entering facility structures.

6.3 PERSONNEL DECONTAMINATION PROCEDURES

Personnel decontamination is not a routine procedure during groundwater or methane monitoring activities at the Mister M facility. Disposable chemical resistant gloves should be changed between each well. If site groundwater comes into contact with skin or eyes it should be rinsed with potable water. If personnel are contaminated by contact with preservatives, remove any contaminated clothing, flush contaminated skin and/or eyes with large amounts of water for at least fifteen minutes, and get medical aid immediately.

6.4 DISPOSAL OF PURGE WATER

All purge water generated at the Mister M facility will be disposed of on the ground at least fifty feet from the nearest well. The purge water will also be disposed of at least fifty feet from public roads, inhabited buildings, natural surface water features, and the property boundaries.

6.5 EMERGENCY INFORMATION

Emergency services can be reached by dialing 911. If non-emergency medical attention is needed, the nearest hospital to the Mr. M facility is the Central Montana Medical Center at 408 Wendell Avenue in Lewistown, Montana. Figure 5 is a map of the location of and directions to the Central Montana Medical Center.

7.0 REFERENCES

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- Tetra Tech, Inc, 2008, "December 2007 Groundwater Monitoring Field Notes and Laboratory Report, Mister M Landfill, Lewistown, Montana"

Table 1: Analytical Parameters from ARM 17.58.708 Table 1.

Inorganics			
Chloride	Sulfate	pH	Specific conductance
Cyanide	Nitrate (as N)	Chemical Oxygen Demand (COD)	

Dissolved Metals

Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)
Cadmium (Cd)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)
Iron (Fe)	Lead (Pb)	Mercury (Hg)	Nickel (Ni)
Selenium (Se)	Silver (Ag)	Thallium (Tl)	Vanadium (V)
Zinc (Zn)			

Volatile Organic Compounds (VOCs) by EPA method 8260

Acetone	Acrylonitrile
Benzene	Bromochloromethane
Bromodichloromethane	Bromofluoromethane
Bromoethane (Methyl bromide)	Carbon disulfide
Carbon tetrachloride	Chlorobenzene
Chlorodibromomethane	Chloroethane
Chloroform	Chloroethane (Methyl chloride)
1,2-Dibromo-3-chloropropane (DBCP)	1,2-Dichloroethane (EDB)
Dibromomethane (Methyl bromide)	1,2-Dichlorobenzene
1,4-Dichlorobenzene	trans-1,4-Dichloro-3-butene
1,1-Dichloroethane	1,2-Dichloropropane
1,1-Dichloroethene	cis-1,3-Dichloroethene
trans-1,2-Dichloroethene	Dichlorodifluoromethane
1,2-Dichloropropane	cis-1,3-Dichloropropene
trans-1,3-Dichloropropene	Ethylbenzene
2-Hexanone (Methyl isobutyl ketone)	Iodomethane (Methyl iodide)
Methylacetylene	Methyl ethyl ketone (MEK)
4-Methyl-2-pentanone (Methyl isobutyl ketone)	Styrene
1,1,1,3-Tetrachloroethane	1,1,2,2-Tetrachloroethane
Tetrachloroethane	Toluene
1,1,1-Trichloroethane	1,1,2-Trichloroethane
Trichloroethane	Trichlorofluoromethane
1,2,3-Trichloropropane	Vinyl acetate
Vinyl chloride	Xylenes

TABLES

Table 1: Analytical Parameters from ARM 17.50.708 Table 1.

Inorganics

Chloride	Sulfate	pH	Specific conductance
Cyanide	Nitrate (as N)	Chemical Oxygen Demand (COD)	

Dissolved Metals

Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)
Cadmium (Cd)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)
Iron (Fe)	Lead (Pb)	Mercury (Hg)	Nickel (Ni)
Selenium (Se)	Silver (Ag)	Thallium (Th)	Vanadium (V)
Zinc (Zn)			

Volatile Organic Compounds (VOCs by EPA method 8260)

Acetone	Acrylonitrile
Benzene	Bromochloromethane
Bromodichloromethane	Bromoform
Bromomethane (Methyl bromide)	Carbon disulfide
Carbon tetrachloride	Chlorobenzene
Chlorodibromomethane	Chloroethane
Chloroform	Chloromethane (Methyl chloride)
1,2-Dibromo-3-chloropropane (DCBP)	1,2-Dibromoethane (EDB)
Dibromomethane (Methylene bromide)	1,2-Dichlorobenzene
1,4-Dichlorobenzene	trans-1,4-Dichloro-2-butene
1,1-Dichloroethane	1,2-Dichloroethane
1,1-Dichloroethene	cis-1,2-Dichloroethene
trans-1,2-Dichloroethene	Dichlorodifluoromethane
1,2-Dichloropropane	cis-1,3-Dichloropropene
trans-1,3-Dichloropropene	Ethylbenzene
2-Hexanone (Methyl butyl ketone)	Iodomethane (Methyl iodide)
Methylene chloride	Methyl ethyl ketone (MEK)
4-Methyl-2-pentanone (Methyl isobutyl ketone)	Styrene
1,1,1,2-Tetrachloroethane	1,1,2,2-Tetrachloroethane
Tetrachloroethene	Toluene
1,1,1-Trichloroethane	1,1,2-Trichloroethane
Trichloroethene	Trichlorofluoromethane
1,2,3-Trichloropropane	Vinyl acetate
Vinyl chloride	Xylenes

Table 2: Purging Stability Criteria

<u>Parameter</u>	<u>Stabilization Criteria</u>
pH	+/- 0.1 standard units
Specific conductance (SC)	+/- 3%
Temperature	+/- 10%
Dissolved oxygen (DO)	+/- 0.3 milligrams per liter
Oxidation-reduction potential (ORP)	+/- 10 millivolts
Turbidity	+/- 10% (or turbidity less than 10 NTUs)

Table 3: Sample Bottles and Preservatives

<u>Parameters</u>	<u>Bottle(s)</u>	<u>Preservation Method</u>
VOCs	2 x 40mL Vials	HCl to pH <2, cool to 4°C
Cyanide	500mL Plastic	NaOH to pH >10, cool to 4°C
Dissolved Metals	250mL Plastic	HNO ₃ to pH <2, cool to 4°C
Nitrate + Nitrite, COD	250mL Plastic	H ₂ SO ₄ to pH <2, cool to 4°C
Chloride, Sulfate, pH, SC	250mL Plastic	Cool to 4°C

Table 4: Holding Times for Table 1 Parameters

<u>Parameters</u>	<u>Holding Time</u>
Sulfate, Chloride, Nitrate + Nitrite, COD	28 days
pH, SC	Analyze Immediately
Cyanide	14 days
Dissolved Metals (Except Mercury)	6 months
Dissolved Mercury	28 days
VOCs	14 days (7 days if unpreserved)

FIGURES

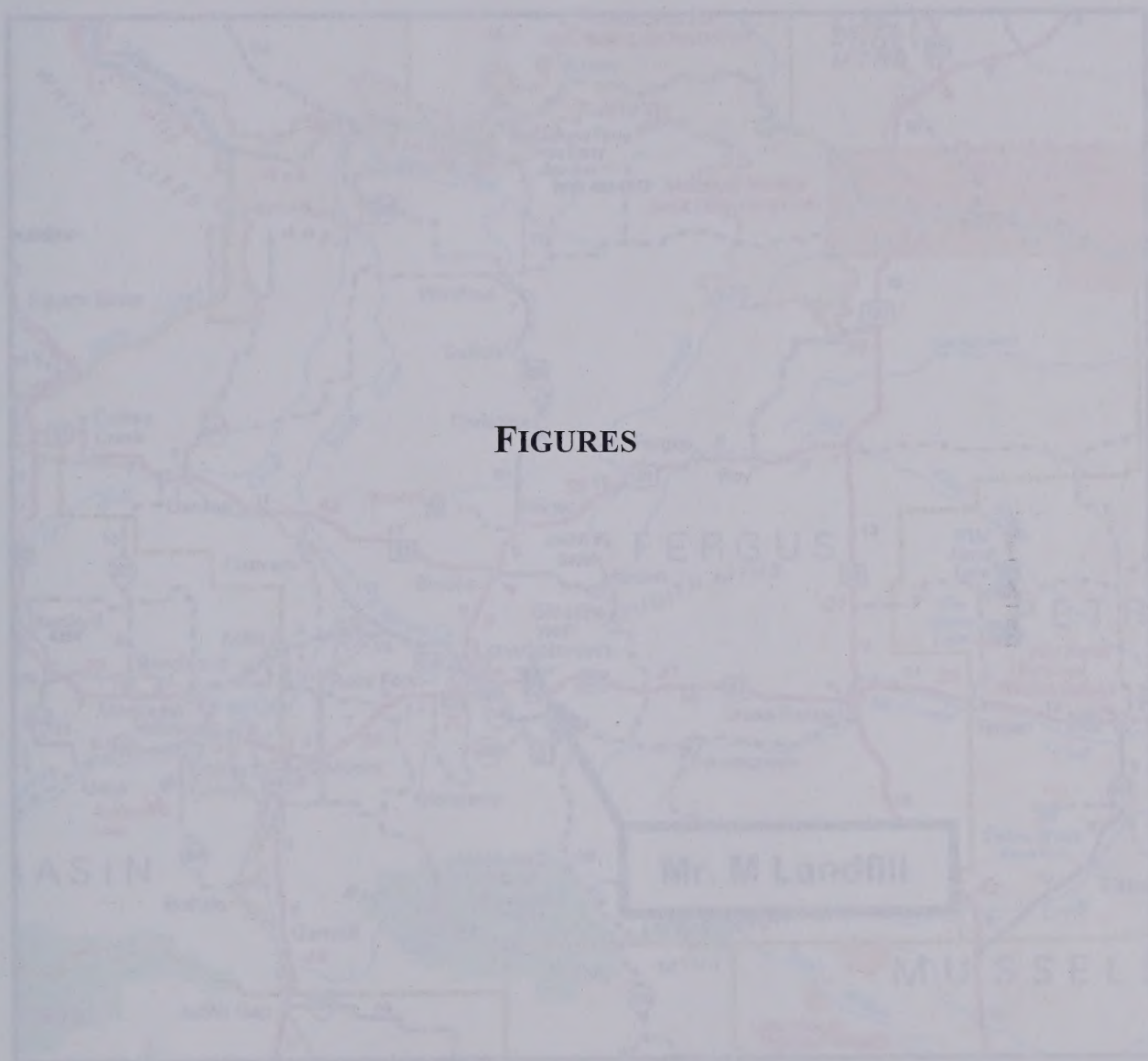


Figure 1: Location Map

Adapted from State of Montana Highway Map.

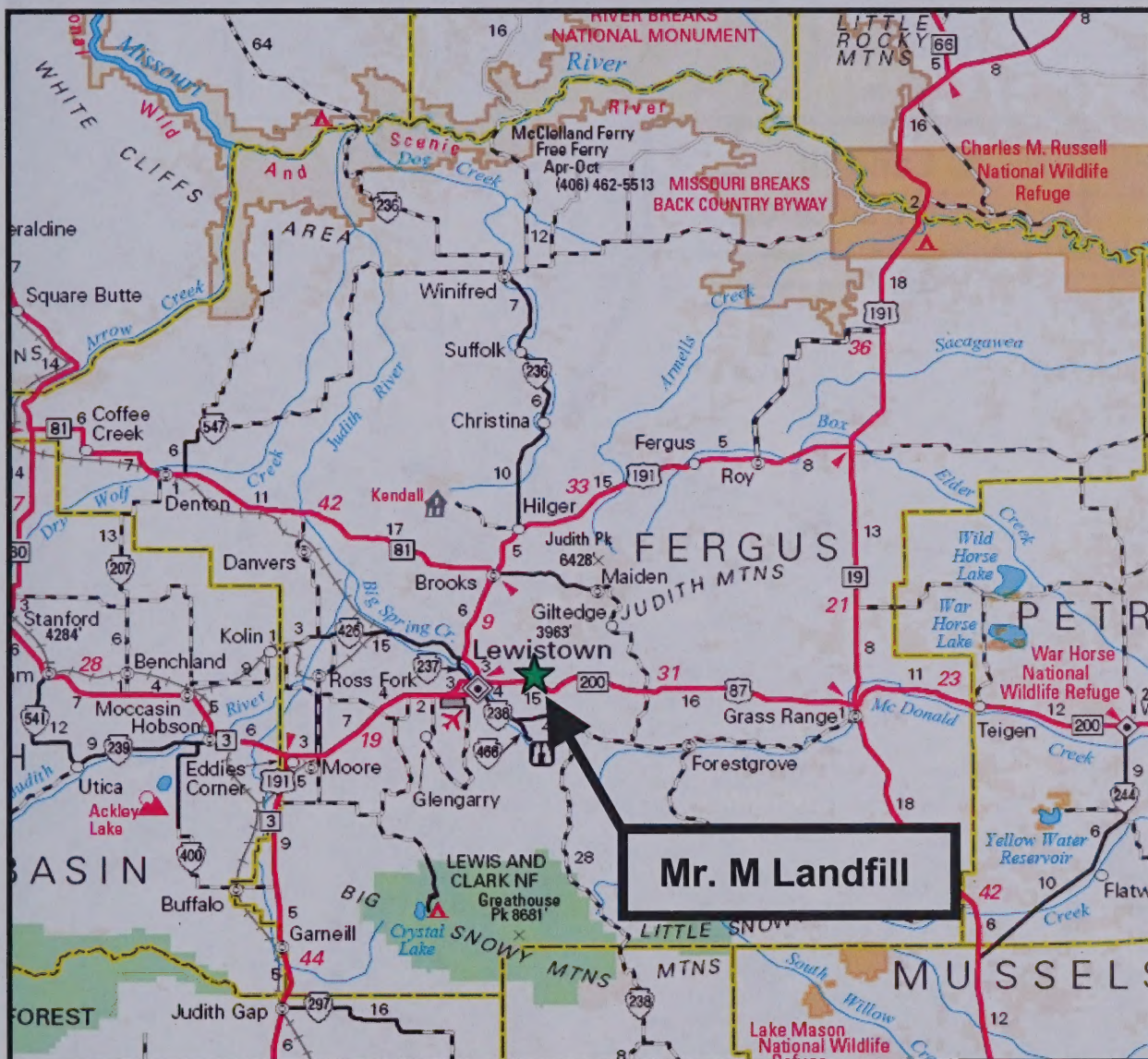


Figure 1: Location Map

Adapted from State of Montana Highway Map.



Figure 3: Locations of Groundwater Monitoring Wells

Base Aerial Photo from 2004.



Figure 4: Locations for Methane Monitoring

Base Aerial Photo from 2004.

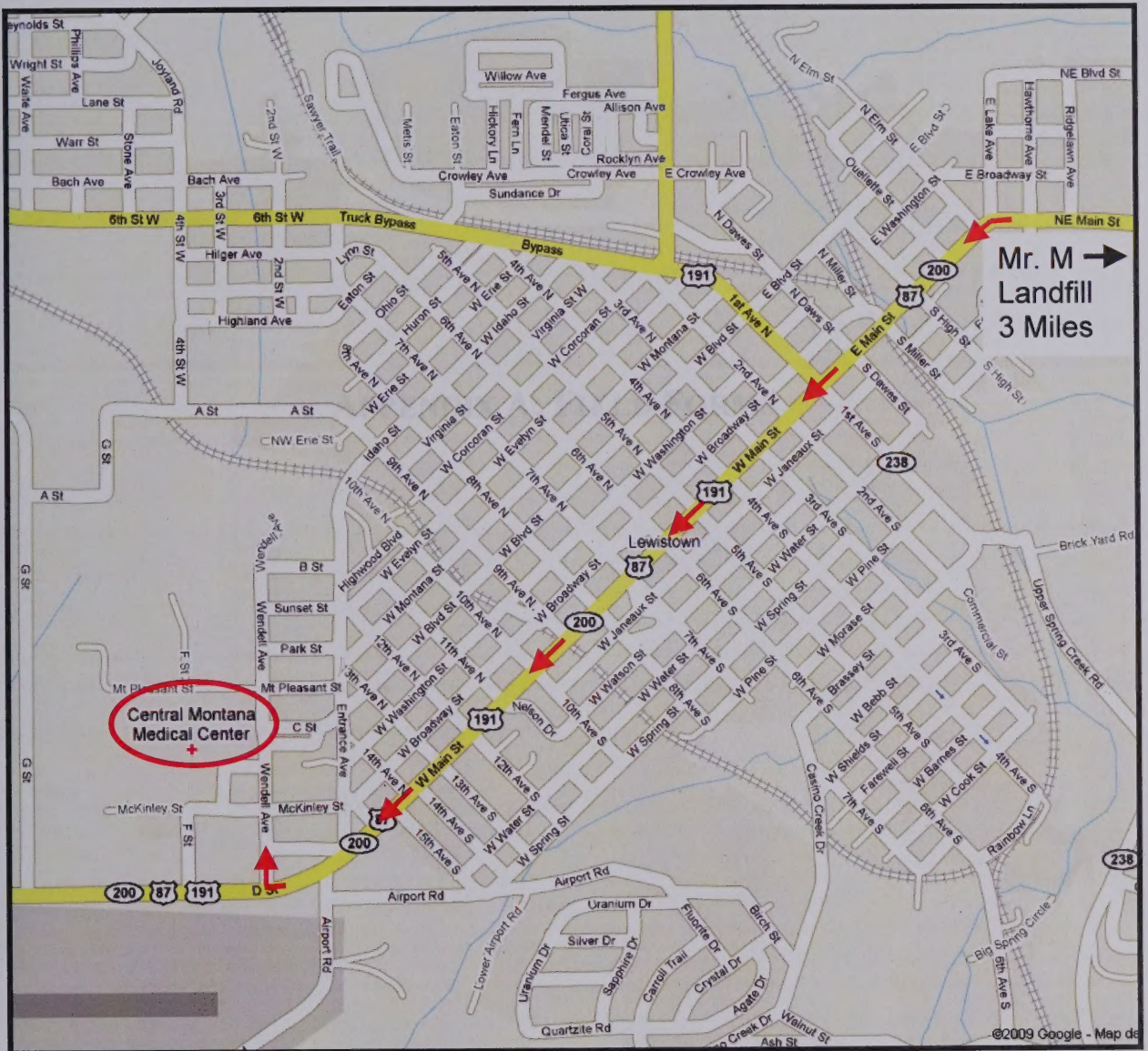


Figure 5: Location of Central Montana Medical Center

Adapted from Google Maps.

APPENDIX A: FIELD FORMS

APPENDIX A: FIELD FORMS

Monitoring Well Purging and Sampling Form

Site Name: _____ Sample Location: _____

Personnel: _____ Sample ID: _____

Date: _____ Field Conditions: _____

Condition of Well: _____

Depth to Water (DTW): _____ Total Depth of Well (TD): _____

Well Diameter: _____ Well Diameter Constant (C): 2" = 0.163 4" = 0.653 6" = 1.469

One Well Volume (gallons) = (TD - DTW) x C: _____ Three Well Volumes: _____

Purge Equipment: _____ Pump Depth: _____ Start Time: _____

Time	Vol. (gal)	Rate (gpm)	DTW (feet)	pH (stu)	SC (mS/cm)	Temp. (°C)	ORP (mV)	DO (mg/L)	Turb. (NTU)	Comments

Sample Time: _____ Sampling Method: _____

Containers	Preservative	Parameters	Comments
2 x 40mL Vial	HCl	VOCs	
500mL Plastic	NaOH	Cyanide	
250mL Plastic	HNO ₃	Dissolved Metals	
250mL Plastic	H ₂ SO ₄	Nitrate+Nitrite, COD	
250mL Plastic	none	Sulfate, Chloride, pH, SC	

Total Volume Purged: _____ Final Depth to Water: _____ End Time: _____

Notes: _____

Sampler Signature: _____ Page ____ of ____

Water Level Measurement Form

Site Name: _____ Date: _____

Personnel: _____ Equipment: _____

Field Conditions: _____

[illegible]

Notes: _____

Signature: _____ Page ____ of ____

Page _____ of _____

Site Name: _____ Date: _____

Personnel: _____

Field Conditions: _____

Meter Model: _____

Parameters/Sensors: _____

[illegible]

Notes: _____

Signature: _____ Page _____ of _____

Methane Monitoring Form

Site Name: _____ Date: _____

Personnel: _____

Field Conditions: _____

Meter Model: _____

Calibration
Time: _____ Standard: _____ Pre-Reading: _____ Post-Reading: _____

Measurement Point	Time	CH ₄	O ₂	CO	H ₂ S	Comments

Notes: _____

Signature: _____ Page ____ of ____

1-5
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FEB 25 1997



R. W. Gillespie & Associates, Inc.

CONSULTING GEOTECHNICAL & ENVIRONMENTAL SPECIALISTS

18 February 1997

MONTANA
DEPT. OF ENVIRONMENTAL QUALITY
COMMUNITY SERVICES BUREAU

Mr M.I.F. 302
Fergus Co.
GW. monitoring
(Canesp)

Marvin and Sandra Mintyala
Mister M Disposal, Inc.
HCR 85 Box 4066
Lewistown, MT 59457

Subject: Revisions to O & M Plan
Mister M Landfill
Lewistown, Montana
RWG&A Project No. 579-03

Dear Marv and Sandy:

Attached please find a revised Appendix C for the above referenced O & M Plan. The revisions pertain to a health and safety plan (HASP) for the groundwater sampling and analytical work plan. Please replace Appendix C in your manual with the revised one which is attached.

If you have any questions or if we may be of further service, please contact us.

Very truly yours,
R. W. GILLESPIE & ASSOCIATES, INC.

Robert W. Gillespie, P.E.

RWG:ci

cc: Patrick Crowley, Sr. Analyst ✓
SHWD, Montana DEQ
with enclosure

APPENDIX C

GROUND WATER SAMPLING AND ANALYTICAL WORK PLAN

PREPARED
BY
ROBERT W. GILLESPIE, P.E.
LEWISTOWN, MONTANA

JANUARY, 1995

Revised February 1997

APPENDIX C

GROUND WATER SAMPLING AND ANALYTICAL WORK PLAN

Revised February 1997

**MISTER M LANDFILL, INC.
LEWISTOWN, MONTANA**

GROUND WATER SAMPLING AND ANALYTICAL WORK PLAN

**PREPARED
BY
ROBERT W. GILLESPIE, P.E.
LEWISTOWN, MONTANA**

JANUARY, 1995

MISTER 31 LANDFILL, INC.
LEWISTOWN, MONTANA

GROUND WATER SAMPLING AND ANALYTICAL WORK PLAN

PREPARED
BY
ROBERT W. GILLESPIE, P.E.
LEWISTOWN, MONTANA

JANUARY 1992

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- Table 2. Sampling Location Summary
- Table 3. Containers, Preservation, and Holding Time
- Table 4. Summary of Analytical Methods and Practical Quantitation Limits
- Table 5. Summary of Data Qualification Guidelines

1.0 INTRODUCTION

The following document outlines the Sampling and Analytical Work Plan for the Mister M landfill located in Lewistown, Montana. This Work Plan has been developed as part of the Operations and Maintenance Plan, and provides for monitoring of ground water. The efforts and work items contained herein adhere to the requirements for such plans contained in Subchapter 7, ARM 16.14.701.

2.0 HEALTH AND SAFETY PLAN

2.1 Introduction

In the course of sampling groundwater, unusual hazards are not anticipated at this site. However, the following sections set forth a simple health and safety plan (HASP) for use by personnel when sampling groundwater from the monitoring well network.

2.2 Personal Safety Equipment

Technicians should be equipped with gloves appropriate to any anticipated contaminant, safety glasses, and appropriate outer wear. Short sleeve shirts are discouraged. A disposable eye wash kit should accompany the sampler.

A photoionization detector (P.I.D.) meter such as the Hnu HW-101 should be in the vehicle for scanning purposes, if, in the opinion of the sampler, a question exists with respect to volatile organic compounds. The P.I.D. should be equipped with a 10.2 eV lamp.

2.3 Emergency Incident Assistance and Reporting

The following sources are identified, with telephone numbers, in the event of an incident or emergency.

City of Lewistown Police/Fire/Ambulance	538-3413
Montana Poison Control Center	1-800-525-5555
SHWB Hazardous Material Response	1-406-444-1430

TABLE 3**CONTAINERS, PRESERVATION, AND HOLDING TIME**

Analysis	Containers	Preservation	Holding Time
Volatile Organics	2-40ml VOA Vials	Cold 4°C	14 days
TOC	1-40ml VOA Vials	Cold 4°C, H ₂ SO ₄	28 days
TOX	2-40ml VOA Vials	Cold 4°C	7 days
Metals	1000ml, P	Field Filtered, NHO ₃	6 months
TSS	250ml, P	Cold 4°C	7 days
TDS	250ml, P	Cold 4°C	2 days
COD	100ml, P	Cold 4°C, H ₂ SO ₄	28 days
BOD	200ml, P	Cold 4°C	2 days
Coliform	200ml sterile, P	Cold 4°C	1 day
Chloride	250ml amber, G	Cold 4°C	28 days
Nitrate	250ml amber, G	Cold 4°C, H ₂ SO ₄	28 days
Sulfate	250ml amber, G	Cold 4°C	28 days
Cyanide	1000ml, P	Cold 4°C, NaOH	14 days
Phenols	250ml amber, G	Cold 4°C, H ₂ SO ₄	28 days
Total Phosphorous	250ml, P	Cold 4°C, H ₂ SO ₄	28 days
NH ₃ -N	200ml, P	Cold 4°C, H ₂ SO ₄	28 days
Hardness	100ml, P	HNO ₃	6 months

NOTES:

P = Plastic

G = Glass

3.0 SAMPLING LOCATIONS AND PARAMETERS

3.1 Baseline Sampling

Baseline data have been collected from a series of monitoring wells and surface water locations at the site for a period of approximately 5 years. These data are presented in the Final Closure Report as Tables 1, 2, and 3 and must be referenced in future work. Parameters include those covered by Table 2 of SWMR 401.6(C)(2)(a).

3.2 Detection Sampling

Detection sampling is intended to provide the opportunity to observe any changes which might occur in the ground and surface waters. Previous work has shown that detected compounds or elements are within the list contained in Table 2 of the aforementioned SWMR. Therefore, the detection parameter list as presented in that table is valid for detection purposes at this site. The parameters are reproduced as Table 1.

Sampling should occur on a semi-annual basis with April and October as the preferred times. Engineering judgement may suggest that earlier or later times are appropriate because of abnormally dry or wet periods. The recommended sampling times are intended to provide a time of higher ground and surface water (April) and one of lower levels (October). Review of USGS precipitation and ground water level data for the area may be useful in the decision making process.

Proposed sampling locations are shown on Dwg. C1 attached and summarized in Table 2.

TABLE 1
DETECTION MONITORING ANALYTIC PARAMETERS

Field Parameters	Ground Water
Ground Water Elevation	X
Specific Conductance	X
pH	X
Temperature	X
Laboratory Parameter	
Antimony	X
Arsenic	X
Barium	X
Beryllium	X
Cadmium	X
Chloride	X
Chromium	X
Cobalt	X
Copper	X
Cyanide	X
Iron	X
Lead	X
Mercury	X
Nitrate-N	X
Nickel	X
Selenium	X
Silver	X
Sulfate	X
Thallium	X
Vanadium	X
Zinc	X
Volatile Organics	X

TABLE 2SAMPLING LOCATION SUMMARY

Location	Ground Water
MW - 10	X
OFFICE WELL	X
HOUSE WELL	X

4.0 SAMPLING METHODOLOGY4.1 Introduction

Sampling methods are prescribed in several national publications including those prepared by EPA and NWWA. The intent of the methods is to develop consistency in sample acquisition thus reducing the number of variables which could influence test data and its evaluation. The following sections provide a general description of sampling methods, containers, preservation techniques, and cautions. Words alone cannot provide the sampler with all the tools; care, attention to detail, and common sense are indispensable. All sampling and analytical procedures will be sufficiently documented to demonstrate that the analytical data has been obtained in accordance with current industry standards of practice and/or accepted EPA Methods.

4.2 Decontamination of Equipment

Prior to sampling, all non-disposable equipment, such as probes, glassware, and field instrumentation, will be decontaminated using the procedures outlined below.:

1. rinse with tap water,
2. wash with mild solution of Liqui-Nox laboratory detergent,
3. rinse with tap water,
4. rinse with 1:1 mix of reagent-grade methanol and distilled water,
5. rinse twice with distilled water.

Disposable PVC bailers will be used for each well to avoid possible cross contamination between wells.

4.3 Ground Water Sampling

Prior to well sampling, the ground water level of the well will be measured and recorded. These measurements will be obtained for use in evaluating and confirming the ground water flow patterns in the site area, and in estimating the volume of water that needs to be purged from the well prior to sampling.

Using the water level data and known dimensions of each well, an estimate of the volume of standing water in each well will be calculated. At a minimum, three calculated well volumes will be purged from each well prior to sampling. To ensure that representative formation water is introduced to the well, the purge water will be monitored for Ph and specific conductance. Stabilization of these field measured parameters will be used as an indication that all stagnant water has been purged and representative formation water is in the well casing.

Samples will be withdrawn by use of disposable PVC bailers. Where appropriate, samples will be placed directly into pre-labeled sample containers in the descending order of volatility potential as outlined below.

1. pH,
2. VOC,
3. TOC,
4. TOX,
5. Phenols,
6. COD,
7. Bacterial,
8. BOD,
9. Metals,
10. Sulfates/chlorides, and
11. field-measured parameters

Samples for metals and sulfate/chloride analysis will be filtered in the field using a 0.45-micron filter.

Upon completion of sampling at each monitoring location, the chain-of-custody document will be completed as described in Section 4.0.

4.4 Sample Containers

Table 3 provides a summary of the sample containers, preservation methods, and holding times for the various parameters being analyzed at the site. Sample containers will be supplied by the Contract Laboratory.

Sample labels will be affixed to each prepared sample container taken into the field. The chemical analysis to be completed, preservative to be used for each container and sample identification will be marked in indelible ink prior to sample collection. All other pertinent information will be transcribed at the time of sample collection.

4.5 Sample Blanks

Sample blanks will be taken throughout the sample event to provide quality control. The goal is to help ensure that sampling protocol is properly executed and that any bias introduced through procedural error is recognized before it seriously effects the data.

On each day of sampling, one trip blank, and two field blanks will be taken. Trip blanks will be supplied by the Contract Laboratory. Field blanks will be filled in the field on each day of sampling. All blanks will be filled with certified analyte-free water supplied by the laboratory. The trip blank will consist of 40-ml VOA vial for organics. The field blanks will be 1000-ml containers for metals and 40-ml vials for organics. All blanks will be shipped to the Contract Laboratory along with the collected samples. Arrangements will be made with the laboratory to postpone analysis of the blanks until the samples have been analyzed and the results verbally communicated to the project engineer. The blanks will only be analyzed if the verbal results are anomalous and/or suggest some type of sample bias.

Blank samples will be taken throughout the sample event to provide quality control. The goal is to be sure that any sample collected is properly analyzed and that any bias introduced through pre-analytical error is recognized before it adversely affects the data.

On each day of sampling, one trip blank, one trip blank, and two field blanks will be taken. Trip blanks will be supplied by the Contract Laboratory. Field blanks will be filled in the field on each day of sampling. All blanks will be filled with certified analytical reagent water supplied by the laboratory. The trip blank will consist of 40-ml VOA and for organics. The field blanks will be 100-ml containers for metals and 40-ml vials for organics. All blanks will be shipped to the Contract Laboratory along with the collected samples. Arrangements will be made with the laboratory to package samples of the blanks with the samples have been analyzed and the results verified independently to the project engineer. The blanks will only be analyzed if the verbal results are in question and/or suggest some type of sample bias.

5.0 CHAIN-OF-CUSTODY PROCEDURES

5.1 Documentation

The chain of custody will be initiated as each sample container is filled. An example of the chain-of-custody form to be utilized for this project, which also serves as the analytical request form for the Contract Laboratory, appears as Figure 1. The chain-of-custody records the date and time of sample collection and documents each individual responsible for the disposition of a given sample until analysis has been completed.

5.2 Sample Transfer, Storage, and Transport

Upon completion of sampling at each site, all samples will be placed in a cooler with ice for temporary storage. Appropriate sections of the chain-of-custody form will be completed and placed with the samples in a waterproof envelope. Following the field sampling, all containers will be inspected and repacked in a freezer pack with fresh "blue ice" packs. Field personnel will review of the chain-of-custody form(s) for the Contract Laboratory to ensure that all samples are accounted for, and that necessary tests have been requisitioned.

After the chain-of-custody form is signed by the appropriate person, it will be placed in a waterproof envelope in the freezer pack. The freezer pack will be wrapped with packing tape and custody seals, and delivered to the Contract Laboratory by a staff member.

Absolutely no sampling will be undertaken on Fridays.

6.0 CONTRACT LABORATORY

A qualified environmental laboratory will be used for all analytical work at the site. Analytical methods and detection limits for the baseline and detection-monitoring parameters are listed on Table 4. The quality control/quality assurance procedures and analytical methods used by the laboratory will be included in the report summarizing the baseline evaluation program.

TABLE 4

SUMMARY OF ANALYTICAL METHODS
AND PRACTICAL QUANTITATION LIMITS
MISTER M DISPOSAL, INC. LANDFILL

PARAMETER	ANALYTICAL METHOD	PRACTICAL QUANTITATION LIMIT (ppb)
Antimony	7040(1)	2000
Arsenic	7060(1)	10
Barrium	7080(1)	1000
Beryllium	7090(1)	50
Cadmium	7130(1)	50
Chloride	9252(1)	1000
Chromium	7190(1)	500
Cobalt	7200(1)	500
Copper	7210(1)	200
Cyanide	9010(1)	200
Iron	7380(1)	50
Lead	7420(1)	1000
Mercury	7470(1)	2
Nitrate-N	350.1(2)	50
Nickel	7520(1)	400
Selenium	7741(1)	20
Silver	7760(1)	100
Sulfate	375.4(2)	1000
Thallium	7840(1)	1000
Vanadium	7910(1)	2000
Zinc	7950(1)	50
Volatile Organics	8260(1)	5

NOTES:

- (1) SW-846: "Test Methods for Evaluating Solid Waste Physical Chemical Methods," USEPA, Third Edition, 1986.
- (2) EPA600/4-79-020, "Methods for Chemical Analysis of Water and Wastes," USEPA, Cincinnati, Ohio, March 1983.

TABLE 1

SUMMARY OF ANALYTICAL METHODS
AND PRACTICAL QUANTITATION LIMITS
METER IN DISPOSAL, INC. LABORATORY

PARAMETER	ANALYTICAL METHOD	PRACTICAL QUANTITATION LIMIT (%)
Ammonia	104001	1000
Ammonium	708001	10
Borates	708001	1000
Bromine	705001	25
Calcium	717001	50
Chloride	603101	1000
Chromium	718001	200
Cobalt	720001	200
Copper	721001	200
Cyanide	601001	200
Fluoride	728001	50
Lead	721001	1000
Manganese	747001	5
Mercury	750101	50
Nickel	721001	400
Selenium	741001	50
Silver	736001	100
Sulfur	725001	1000
Tellurium	741001	500
Vanadium	707001	2000
Zinc	705001	50
Volatiles Organics	828001	5

NOTES:

- (1) SW-846 "Test Methods for Evaluating Solid Waste Physical/Chemical Methods" USEPA, Third Edition 1988
- (2) EPA-800/3-79-010 "Methods for Chemical Analysis of Wastes and Wastewater" USEPA, Cincinnati, Ohio, March 1983

7.0 PRESENTATION OF RESULTS

7.1 Data Evaluation Procedures

Data generated by the ground and surface water monitoring program will be evaluated for reasonableness of results as received from the Analytical Laboratory. The evaluation will be essential in identifying data that may not be representative of site conditions.

An important aspect of ensuring representativeness in tabulated analytical results is the issue of correction for contamination in trip blanks and field blanks. Given that these blanks are filled with certified analyte-free water, detection of any analytes in these sample suggest introduction of contamination that is not representative of the medium sampled. Thus, when analytes are detected in both an environmental sample and an associated blank, data will be flagged and/or adjusted. Table 5 summarizes the criteria for blank correction, as outlined in EPA Region I data-validation guidelines. These criteria will be used as part of the data review process.

In situations where anomalous concentrations of constituents appear in samples for which corresponding detections are not seen in blanks, the plausibility of these detections will be evaluated through review of the chemical record for the well and the hydraulic and geochemical transport regimes in effect at the site. If reasonable and plausible explanations for anomalous detections are identified according to these criteria, the detections will be flagged "S" for suspect. In situations where suspect data is not replicated in the next sampling round, the original data will be flagged "R", for rejected, and the data will not be used for evaluation purposes. If confirmed, the original data will be removed as being suspect and considered valid.

1.1 Data Evaluation Procedures

1.1.1 Data Evaluation Procedures

These procedures are designed to ensure that the data submitted for review are of high quality and that the data are representative of the population of interest. The procedures will be applied to all data submitted for review and will be used to determine the quality and representativeness of the data.

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TABLE 5**SUMMARY OF DATA QUALIFICATION GUIDELINES**

PART 1: CORRECTION FOR CONTAMINATION IN BLANKS	
FOR common laboratory contaminants:	Methylene Chloride Acetone Toluene 2-Butanone
Sample concentration is >MDL but <10x blank concentration	Sample concentration is <MDL and >10X blank concentration
Flag result with "U" (undetected)	No qualification needed
PART 2: QUALIFICATION FOR HISTORICAL AND GEOCHEMICAL ANOMALIES	
Sample concentration is >MDL but anomalous with respect to chemical history of the well and/or hydraulic or chemical principles (1).	Sample concentration is >MDL but immediate resampling fails to replicate the anomalous result.
Flag result with "S" (suspect)	Flag result with "R" (rejected)

NOTES:

(1) Examples of these anomalies include:

- * detections of constituents unrelated to on-site wastes
- * detections of contaminants in background wells
- * unprecedented detections which are not replicated by subsequent sampling events

MDL = Method Detection Limit

U = Undetected

S = Suspect

R = Rejected

Source: USEPA Region I Data Validation Guidelines

7.2 Reports

A report of all findings will be issued to DHES after the second detection sampling event occurs. The report will include an analysis of the site hydrogeology with respect to quality trends as they related to Solid Waste Management Regulations primary drinking water standards.

Data gathered during the detection-monitoring program will also be submitted for DHES review on an annual basis. A brief summary of the analytical data will be prepared and issued within 15 days of receipt of the analytical results from the Contract Laboratory.

A report of all the work done in 1955 under the second phase of the program is being prepared. The report will include an analysis of the progress made in the various areas of the program, a list of the work done, and a list of the work to be done in 1956. The report will also include a list of the work done in 1955 under the first phase of the program.

The work done during the first phase of the program will also be reported to the Board of Directors. A brief summary of the work done will be presented and a list of the work to be done in 1956 will be presented. The work done during the first phase of the program will also be reported to the Board of Directors.

13-00000

File: Fergus Co
Mister M
grd wtr (corr)



R. W. Gillespie & Associates, Inc.

CONSULTING GEOTECHNICAL & ENVIRONMENTAL SPECIALISTS

28 August 1996

RECEIVED

Mr. Patrick Crowley
Montana Dept. of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

SEP 03 1996
Montana Department of
Environmental Quality
Waste Management Division

Subject: Closure and Re-Installation of MW-7, 9, and 10
Mister M Landfill
Lewistown, Montana
RWG&A Project No. 579-03

Dear Pat:

In a recent conversation with Jon Dilliard of your office, I inquired about our correspondence which responded to your site visit, etc., with particular concern regarding closure and re-installation of MW-7, 9, and 10. Mr. Dilliard indicated some knowledge of our correspondence, and we inferred he would discuss the matter with you.

At this writing, the wells are scheduled for closure and re-installation during the week of 16 September 1996. The work will be performed in general accordance with DEQ regulations, and logs of the closures and new wells will be provided to your office shortly thereafter. You are invited to observe installation should you desire.

If you have any questions, please contact us.

Very truly yours,
R. W. GILLESPIE & ASSOCIATES, INC.

Robert W. Gillespie, P.E.

RWG:ci
cc: Mister M Disposal, Inc.

